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DISABILITIES, INCLUDING INJURIES, CAUSED BY BULLETS, SHRAPNEL, HIGH EXPLOS- IVES, ETC., AS ILLUSTRATED BY CASES EXAMINED BEFORE A MEDICAL BOARD AT CANADIAN HEADQUARTERS, SHORN- CLIFFE, ENGLAND*

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THE institution in military organization known as a Medical Board consists of three members, a president and two colleagues. Two such boards were formed from the personnel of No. 4 General Hospital in June, 1915, and sat daily at Shorncliffe for some weeks. Their duties consisted in examining men who were or had been physically unfit either because of illness, or from injuries received in action. The greater number of the cases examined in this particular instance were men who had either been wounded or had been the victims of gas-poisoning at the front and who had sufficiently recovered to be able to present themselves before such a board for examination for the purpose of determining their physical condition. Men who had been rendered permanently unfit for further service by their injuries were recommended for discharge from the Force. If it was found that the man was not permanently unfit then we had to state if we considered him fit for home service or for "light duty". If a man were temporarily unfit for home service or light duty we were required to give our opinion as to the probable period which would elapse before he would be considered fit. In some instances a man might be quite unfit to go into action and yet be able to render valuable

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service in various positions in England, such as instructor, office-clerk, officer's servant, etc. For example, a man might be incapable of standing the strain of heavy marching but would be quite equal to the task of work as clerk in an orderly room.

The number of cases which came under our observation in eight weeks was 819. In addition to injuries received in action there were disabilities the result of flat foot, hernia, varicose veins, heart disease, pulmonary tuberculosis, epilepsy, etc. The following list of the 819 cases examined will give some idea of the type of disability we had to deal with in individual instances.

CLASSIFIED LIST OF CASES EXAMINED BY THE MEDICAL BOARDS

Non-Traumatic Conditions:

Flat foot.	43
Varicose veins of leg.	17
Varicocele.	9
Hæmorrhoids.	17
Hernia.	23
Heart disease.	40
Tuberculosis, in the Lungs. 24	34
elsewhere. 10	
Defective vision.	23
Epilepsy.	16
Gonorrhœal arthritis.	2
Alcoholism.	4
Syphilis.	3
Insanity.	3
Goitre.	4
Lateral curvature of spine.	4
Exposure to wet and cold:	
"Frost-bite".	6
Rheumatism and sciatica.	22
Lungs and Pleura, affections of, other than tuberculosis.	17
Gastritis, ulcer, etc.	6
Pyorrhœa alveolaris.	4
Malingering.	1
General ill health due to a variety of causes, anæmia, nephritis, etc.	16
	<hr/> 314

"Gas" poisoning:

No second disability	43
With nerve exhaustion.	17
With wound elsewhere.	36
	<hr/> 96

Traumatic Conditions:

Traumatism due to accidents and <i>not</i> caused by bullets, shrapnel, etc.	
Fracture of long bones.	9

Sprains and dislocations:

Knee.....	13
Ankle.....	6
Hand, wrist.....	9
Other joints.....	9—37
Injuries to head, concussion and scalp wounds.....	4
Cellulitis of extremities.....	14
	<hr/> 64

Traumatic Effect of High Explosives:

Neurasthenia.....	61
Deafness.....	18
	<hr/> 79

Gunshot Wounds:

	Shrapnel	Bullet	Bullet or Shrapnel, not specified	
Head:				
Skull, scalp, jaws.....	14	11	..	
Loss of eye.....	..	4	22	
Face.....	..	4	..	
Neck.....	..	2	..	
Upper extremity:				
Shoulders.....	6	7	..	
Arm and forearm.....	6	30	..	
Hand and wrist.....	10	17	..	
Chest.....	2	6	..	
Abdomen.....	4	2	..	
Spine.....	3	4	..	
Lower extremity:				
Hip.....	3	
Thigh and leg.....	13	22	..	
Knee.....	4	6	..	
Foot.....	9	7	..	
No locality given.....	20	18	..	
General effects of shell fire.....	10	
	<hr/> 104	<hr/> 140	<hr/> 22	
Total.....				266

SUMMARY

Non-traumatic conditions.....		314
Traumatic effects of high explosives.....	79	
Traumatism due to accidents and not caused by bullets, shrapnel, etc.....	64	
"Gas" poisoning cases.....	96	
Gunshot wounds, bullets, shrapnel, etc.....	266	
	<hr/>	505
Grand total.....		819

It will be seen that the greater number were those of injuries received in action, of these a much larger number of injuries were received in some portion of the body above the waist than in the legs or abdomen. Unfortunately in the records which we have preserved the locality is not stated in all. These will be more carefully tabulated for statistical purposes when the records are finally disposed of in the statistical department of the War Office, but in the less detailed notes which have been kept here for our own purposes it is evident that injuries received in the trenches are more likely to be about the neck and upper extremities than elsewhere about the body. That is as one would expect especially as our observations are necessarily restricted to cases of men who are not fatally injured and who have recovered sufficiently to be able to present themselves before a board.

We shall first speak of a class of disability which preëxisted in minor degree at the time of enlistment and which had been aggravated by the conditions of active service with the result that the man was rendered more or less permanently unfit for further physical strain.

1. *Flat Foot*: This constituted by far the largest number in this series. In the vast majority of instances one found that men incapacitated by flat foot gave a history of trouble prior to enlistment. These men had the condition greatly exaggerated by heavy marching: they suffered pain and had frequently to drop out of the ranks when on route march. In many instances they were unable to stand without a considerable amount of pain. The condition varied in degree sometimes being of a very exaggerated type while at other times the arch was not entirely obliterated. One frequently hears the question discussed as to whether a man with marked valgus and free from pain should be permitted to enlist. In our present observations it is impossible to state the percentage of such cases which are able to continue their duties without discomfort, but unquestionably many of these men break down and become incapacitated. The conditions of active service are such as to increase the disability caused by flat foot. We would therefore argue that in recruiting such men should be rejected.

2. *Varicose Veins of the Leg*: Here again experience shows that such conditions are much aggravated by active service. Comparing the disability with that of flat foot it would appear that a larger percentage of cases were unaware of the existence of varicosities on enlistment. There have been a number of instances where extensive recurrence has occurred after operation and one is convinced that a

sufficient time is not allowed to elapse after operation before the man is allowed to go on duty. Unquestionably at least three months should pass after removal of varicose veins before a man is allowed to undertake heavy marching.

3 *Varicocele*: This condition does not produce anything like the degree of disability caused by flat foot or varicose veins of the leg and it is much easier to obtain radical relief by operation than in the case of the other two conditions. The fact that we have had nine instances of disability from this cause, however, shows that it is important to have the condition rectified before enlistment.

4. *Hæmorrhoids*: What we have said regarding varicocele applies in all particulars to piles. The degree of disability is often extreme. Pain and hæmorrhage are the chief complaints and the man is rendered absolutely unfit when these symptoms are exaggerated.

5. *Hernia*: As far as our experience goes no man was enlisted who was known to have a hernia at the time. Two classes of cases presented themselves, those who had developed a hernia for the first time in active service and those who suffered recurrence after operation. Men who have submitted to an operation are frequently allowed to undertake military duties far too soon. At least three months should elapse after radical cure before a man is permitted to undertake the strain of active service. Indeed it is a question whether such a man is fit for the strain of duties entailed upon him in the firing line, even if a successful radical cure has been accomplished. Unquestionably men who have suffered a recurrence are permanently unfit for service at the front.

6. *Heart Disease*: A number of heart cases have been examined. Some of these are recent cases and have undoubtedly developed during active service, some men giving a history of rheumatism following exposure. Others dated their trouble to a period prior to enlistment. We were compelled to discharge a number who were obviously unfit, but occasionally the heart lesion had been discovered accidentally by the regimental medical officer in cases in which there was perfect compensation. Such cases we considered should not be subjected to the strain of active service at the front but were recommended for less arduous work.

7. *Tuberculosis*: This was manifested in various lesions of lungs, glands and joints. Men on active service are necessarily exposed to wet and cold and at times it may be impossible to obtain shelter from bad weather for hours or days together. Under these circumstances it is not surprising that there is a danger of pulmonary

tuberculosis developing in those who are predisposed thereto. In a large percentage of the cases examined it was obvious that an active condition had been engrafted upon a healed lesion or the physical signs showed an old quiescent lesion in one lung with acute trouble in the other. It is therefore obvious that the recruiting Medical Officer should be careful to refuse to pass men as physically fit who have a known predisposition to tuberculosis or who present evidence of having previously had tuberculosis of the lungs. We encountered very few cases of cervical tuberculous glands and a still smaller number of tuberculous joint disease, but in two instances an old healed lesion in the spine, with slight kyphosis in each case was found. The trouble had undoubtedly been quiescent for years but had apparently become active as a result of the exacting and strenuous life of active service.

8. *Defective Vision: Deafness:* Several men had been found unfit for duty because of defective vision chiefly myopia and astigmatism. Most of these had a high degree of myopia, in one eye only, the result in most instances of a slight strabismus. Such men are incapacitated for shooting and must therefore be considered unfit to go into action. Deafness is obviously a great handicap to a soldier and where at all marked the man is absolutely unfit for service. One man was very deaf and told us he was unable to hear the words of command.

9. There were other conditions such as epilepsy, chronic alcoholism and lateral curvature of the spine of which we had examples. One man had a most exaggerated degree of lateral curvature with fixed deformity rendering him absolutely unfit for duty. The epileptic is obviously unable to serve at the front. He is a source of danger to his comrades and at any moment may become quite incapable of looking after himself.

A study of all these conditions emphasizes the importance of adhering absolutely to army regulations in the recruiting office. Many of the conditions enumerated in the above list are examples of the failure to comply with these regulations on the part of the medical examiner at the time of enlistment. We note these conditions in order to urge that more care should be exercised in this particular. Men who are thus physically unfit and who are permitted to enlist have a miserable existence for weeks or months until finally they are compelled to relinquish the effort to continue their duties. Few of these men ever reach the front, they are a source of expense to the country and have served no useful function. Many of them have done themselves permanent injury in the at-

tempt. It is therefore obvious that in the interest of the individual and of the country he seeks to serve, such cases should be rejected at the recruiting office.

We shall now proceed to deal with disability arising primarily as the result of injuries received while in action.

1. *Gas Poisoning*: There were ninety-six cases before us. We saw no recent cases. With, I think, no exception, they were men who had been poisoned at Ypres on the 23rd or 25th of April, i.e., three months after having been subjected to the fumes. As far as our observation goes it would seem that while the Germans inflicted serious damage on our troops during those few days in the latter part of April, they never succeeded again in their diabolical effort to gain ground by this contemptible method of poisoning men. Prompt measures were taken to protect our men against the influence of gas and these efforts seem to have been wholly successful so that it seems certain that no further injury will be caused by such means. It is true that some cases of short exposure to the influence of gas have occurred since April but the effects of these have been very evanescent. Regarding the more serious effects of gas we learn that not a few cases proved fatal soon after exposure or within the first few days. In our board work we had to deal with many cases of serious poisoning who had passed the initial danger but were still suffering from symptoms more or less distressing. Shortness of breath was complained of on exertion, or, at times, coming on apart from exertion, the man occasionally waking at night with dyspnoea. These men usually complained also of excessive secretion with expectoration particularly in the morning. The physical signs on examining the chest were practically negative and it was remarkable that one was never able to detect by this means any serious lesion in the lung. Next in order came marked gastric irritability, evidenced by the fact that the man was unable to retain any solid food. Many of these cases were able to take milk and soups but the moment they took solid food of any description they vomited. Occasionally we were told that the man would vomit in the morning only, this occurring immediately upon his first meal for the day, no matter what type of food was taken, but that he had no trouble with dinner or supper provided he took fluids. Over a period of weeks in many cases there had been no improvement. We also got a history in several instances of hæmorrhage from the bowel with diarrhoea and hæmaturia in the early stages.

The problem which thus far we are unable to solve is whether

or not the damage done to the gastro-intestinal tract or to the respiratory organs is permanent. These men continue to have symptoms three months after the exposure to the gas, and occasionally with little or no tendency to improve. We have no previous experience of such cases to go upon and we are therefore quite unable to determine whether the damage done is permanent or not.

The cases of gas poisoning frequently were victims of other injuries, suffering possibly from nervous shock or from wounds.

2. *Exposure to Cold and Wet in the Trenches:* This as we have seen was sometimes the cause of lighting up a latent pulmonary tuberculosis or again it induced rheumatism, sciatica, etc. Frost bite of the feet was observed in a number of instances: the exact nature of this is not quite evident. The men in cold weather were standing in water, wearing boots and putties, the feet and legs were soaked. This as we know from reports from the front sometimes induced extensive gangrene resulting in the loss of the foot or leg. We saw the minor effects in those who had recovered after a superficial ulceration such as would result from frost bite and often the characteristic painful and congested cicatrix was producing marked disability.

3. *Nervous Shock:* Men exposed in the trenches to heavy shell fire are inevitably exposed to nerve strain and the effect produced varies within wide limitations. Occasionally there is a somewhat sudden and complete breakdown with results which continue for months. At other times a man may come through all this nervous strain and possibly receive serious wounds without any appreciable collapse of this nature. Some men who suffered in a severe degree appear to be complete wrecks. They are usually very emotional and may break down as they are telling their experiences. Tremor is always a characteristic symptom. The heart's action is rapid, the pulse being from 100 to 120 per minute. The knee jerks are markedly exaggerated—insomnia, anorexia and a constant feeling of fatigue are common. The man is wholly unfit for sustained effort of any kind, his memory is frequently defective and he is obviously worried and apprehensive. These men should have every consideration and should be provided with a suitable environment to ensure recovery. A period of months must elapse before a man who has severe symptoms is fit to assume duty again and occasionally years may elapse before recovery. It is therefore difficult to arrive at a conclusion in endeavouring to predict how soon the individual case will be physically fit for duty. We are told by

those at the front that the tendency is to send these men into action too soon, the result being a second breakdown under much less strain than the first. Our impression is that many cases of the exaggerated type will never be fit for active service during the present war.

4. *Head Injuries: (a) Injuries to Special Senses: Vision* was impaired by various types of injury. There were twenty-six cases of loss of one eye, in most instances enucleation had to be performed subsequent to the injury because of the extensive damage which had been inflicted. Then again injuries by bullets or shrapnel in the neighbourhood of the eyeball not infrequently resulted in separation of the retina or hæmorrhages causing permanent impairment of vision. *Deafness:* This results from the effect of high explosives, the drum may be perforated and resulting otitis media may cause serious trouble. The auditory nerve is also affected in many instances and thus permanent damage may be done. *Affections of Speech:* This gives us some most interesting conditions, of which perhaps *stammering* is the most remarkable. For example, a man of twenty-two was in the trenches when a shell knocked a portion of the parapet over on top of him. He was buried under debris and rendered unconscious. He waked up some two days afterwards in the hospital at Rouen. He had a flesh wound of the right leg caused by shrapnel but this healed readily. When seen by us two months after the injury his mentality was perfect, he could read and understand readily all that was said to him but he had largely lost the power of continuous articulate speech. His effort to say "Yes" in reply to a question, for example, would be accompanied by irregular contraction of various muscles. He jerks his head spasmodically, his arms twitch and he slaps his thigh until at last he succeeds in pronouncing the word which comes out in a final spasmodic fashion. If it is a sentence, after he manages to pronounce the first word the whole sentence comes rapidly one word succeeding the other with great speed. The difficulty seems to be in getting the initial word. It would seem as if when the motor centre for speech is stimulated there were an overflow of stimuli to the centres controlling movements of the head, neck and arms resulting in irregular muscular contraction. Numerous instances of less marked stammering were observed from similar injuries and one learns on inquiry that it is quite a common occurrence as the result of injuries in action. In the cases observed it is obvious that improvement takes place slowly but the prospect of final complete recovery is good.

Fracture of the Skull: We had a few examples of this but, judging from our experience, it would seem that practically all cases in which a bullet perforates the cranium and brain result fatally.

Fracture of the Jaws: This is not uncommon and we have had numerous instances both by bullet and shrapnel. A few cases may be quoted to illustrate some narrow escapes. A man of twenty-two was struck by a bullet on the left nasal bone; it passed to the right, downwards and slightly backwards and made its exit through the right malar bone. It severed the right infraorbital nerve and caused ectropion of the right lower eyelid. The explosive effect of the bullet caused permanent damage to the retina with loss of sight of the right eye. In another man a bullet entered below the anterior portion of the zygoma on the left side and traversing the facial bones made its exit on the right side of the face at a slightly lower level. The only damage persisting seemed to be some narrowing of the right nasal passage requiring a slight operation for his relief. One man presented himself with a scar below the middle of the left zygoma; he produced a circular piece of metal 1 inch in diameter and $\frac{1}{4}$ inch thick possessing a screw thread on its edge. This had been found in the wound by x-ray and removed by operation. The circular piece of metal was no other than the cap on the top of a shrapnel shell. The only disability this man suffered was inability completely to open his jaws.

Scalp Wounds: Flesh wounds from either bullets or shrapnel were of common occurrence among the men who came before us and not a few of these were in the scalp. In one case the soldier had twice narrowly escaped serious injury. He had two longitudinal scars on the top of his head, each was about three inches in length and they ran parallel to one another. One was caused by a bullet in April. The wound healed readily and on his return to the trenches he received the second scalp wound from shrapnel. Another case was that of a man who received a bayonet wound in the forehead. He was a lad of twenty-one who told an interesting tale. He stated that a German attempted to bayonet him but he knocked his rifle up and so received a glancing cut from the bayonet on his forehead. He then hit the German a blow on the chin with the butt of his rifle and the enemy started to run away. He then drove his bayonet into the man's buttock up to the hilt and was unable to pull it out. Blood from the wound in his forehead now trickled down over his eyes and blinded him so that he had to be carried back to the dressing station.

5. *Concussion of the Spinal Cord:* Several men gave a history

which could only be explained by this type of injury. A man received a severe blow on the back from shrapnel causing immediate paraplegia. The paralysis lasted three or four weeks after which he completely recovered the use of his limbs but continued to suffer from nervous shock. Another case with a similar history was in the trenches when a shell burst and upset a number of sandbags on the parapet. These in falling struck the man in the back. He was knocked down and buried under the sandbags and immediately became paraplegic. This cleared up in a short time.

6. *Injuries to the Lungs:* We saw no cases of extensive laceration of the lungs such as would be caused by shrapnel; no doubt most if not all such cases prove fatal, but we encountered several instances of penetration of the lungs by bullets with recovery. We may cite two cases where the bullet must have traversed a considerable portion of lung tissue. Penetration of the right lung occurred in a man twenty-eight years of age. The bullet entered 1 inch below the outer end of the right clavicle; it passed downwards, backwards and inwards and made its exit at a point 2 inches to the right of the middle line where there is a vertical scar 2 inches long opposite the ninth and tenth dorsal spines. When we examined him two and a half months after the injury he complained of pain radiating along the ninth intercostal nerve towards the middle line in front. The ninth rib was fractured posteriorly. He coughed up large quantities of blood immediately after the injury but he made a complete recovery. Another remarkable case was that of a man of twenty-seven who was injured at St. Julien on April 22nd. A bullet entered his back at a point 3 inches to the left of the middle line above the tenth rib. It came out 1 inch external and 2 inches below the left nipple. He immediately spat blood in such quantity that he almost suffocated. He never lost consciousness but his companions were sure he was dying and being a Catholic the last rites were administered and his wound was not dressed. He survived, however, and was removed to the dressing station. He now presents himself in excellent health. He is a piper and he says he cannot blow the pipes at present because it causes him some pain in the left chest. On examining the scar in the front of the chest it is observed to pulsate, as the apex beat of the heart is immediately behind it. It is obvious that the bullet had passed in immediate proximity to the heart.

We are told that these cases of penetrating wounds of the lung usually develop a hæmothorax but no evidence was present, in those cases examined which suggested it, that there had been blood in the pleural cavity.

There were some cases of hæmorrhage from the lungs following severe crush without any penetrating wound. Thus a man of the Princess Patricia's Battalion was buried under portions of the parapet which had been driven in upon him by a bursting shell. He was buried under the debris for twenty minutes and he at once coughed up blood in considerable quantities. The bleeding ceased but he had a second very severe hæmorrhage. The physical signs showed some evidence of a fibrosed condition of the right apex and possibly an old healed tuberculous lesion had predisposed to the hæmorrhage.

7. *Wounds of the Chest Wall:* Here, as elsewhere, flesh wounds were common. One case illustrating a remarkably narrow escape was that of a man aged twenty-two who was struck with a bullet on the front of the chest. He fortunately had a packet of letters in his right breast pocket. This contained a dozen letters and formed a pad an inch and a half thick. The bullet hit this packet and passing obliquely through it from right to left caused a wound which extended from the fifth right costal cartilage 2 inches from the sternum, upwards and to the left, terminating over the second left costal cartilage close to the costo-sternal articulation. In its passage the bullet grooved a furrow out by the sternum. The explosive effect of the bullet caused some laceration of the lung tissue beneath, as he spat blood freely for some hours after the injury.

8. *Injuries to the Abdomen:* Flesh wounds of the abdominal parietes were exceedingly common but we met with no case of penetration of the abdominal viscera. We are told from the front that these occur, and remarkable recoveries are said to take place after penetrating wounds of the intestines by bullets. On this series of 819 cases not a single example was found and if we judged from the great variety of injuries presented above we would be driven to the conclusion either that penetrating wounds of the abdomen are comparatively uncommon or that such wounds are much more frequently fatal than wounds elsewhere in the body.

Injuries of the Extremities: (a) *Flesh Wounds* are exceedingly common, often quite superficial and producing little or no disability. (b) *Injuries to Bone:* Here we found great variety of damage. In one remarkable case a bullet had passed clean through the lower end of the femur, making a hole in the bone but not breaking the continuity of the femoral shaft. A large amount of callus was produced in the healing process but the man recovered with little disability. Many instances of severe and comminuted fracture of the long bones were produced by shrapnel and bullet. The bones

of the hand and less frequently of the foot were fractured, producing varying types of deformity and disability. (c) *Injuries to Blood Vessels*: There were no important blood vessels severed in the series of cases presented. (d) *Injuries to Peripheral Nerves*: These formed one of the most interesting groups of the series, especially in the upper extremity. It seemed remarkable how frequently the injury was restricted to an individual nerve. One may cite a few examples. A man received a bullet wound of the left axilla and presented himself before our board with marked disability caused by paralysis of the circumflex nerve. The left arm was markedly elevated by contraction of the trapezius, and adducted. The deltoid was completely atrophied and the man was absolutely unable to abduct the arm from the side. There was anæsthesia of the skin over the deltoid. The disability was of course extreme. It is questionable if much could be done for his relief as in all probability a considerable segment of the nerve had been destroyed. Another man had a bullet enter the left arm on the antero external portion about 3 inches above the elbow. It came out on the postero internal aspect 5 inches above the elbow. There was no history to indicate that any important blood vessel was injured but the median nerve was divided as indicated by the complete paralysis of the flexors supplied by it, the outer group of muscles of the thenar eminence and the loss of sensation over the portion of the palm and digits supplied by the median. There was one case where, obviously, there had been contusion of the ulnar nerve but the paralysis when we saw the man was not complete. A bullet entered just above the condyles on the inner side of the arm posteriorly and made its exit on the outer side. A flesh wound resulted and probably the bone was scraped. There was diminished sensation in the ring and little fingers, with hyperæsthesia above the wrist on the inner side of the forearm, marked weakness of the interossei and inner lumbricales and the short muscles of thumb and little finger but no complete paralysis. These cases of nerve injury are interesting and present difficulties in determining whether there is complete severance or merely contusion and raise the question as to the treatment which should be pursued as to operation or otherwise.

Many instances of remarkable escapes from serious injury were noted. Thus a man aged twenty-four had a bullet wound through the left axilla. The bullet entered just below the left coracoid process in front and traversing the axilla made its exit posteriorly just behind the posterior axillary fold on a level with the sixth dorsal spinous process. There was absolutely no disability or damage of

any important nerve or blood vessel. In the lower extremity a man had a bullet enter the outer side of the left thigh 2 inches below the great trochanter and, passing in front of the femur with a slight obliquity downwards, it made its exit on the inner side, it then entered the right thigh and continuing the same direction came out on the outer side of the right thigh. There was no important vessel or nerve damaged and the disability was negligible. There were numerous joint injuries with varying degrees of stiffness and disability. One interesting case was due to severe injury to the right knee joint with severance of the anterior crucial ligament. The man was walking in the trenches when a sand bag fell on his thigh and knee causing the injury. With slight force one could dislocate the tibia forwards and inwards. The disability was so great that he was considered unfit for further active service.

The object of these notes, which are much more extensive than the author originally intended, is to indicate the type of cases which come before a medical board and the important and responsible duties which are discharged by such an organization during active service.

It is announced that the Honourable Frank E. Hodgins, Justice of the Supreme Court of Ontario, has been appointed by the provincial government to enquire into the subject of medical education in the province. It will be remembered that, at the opening of the new General Hospital, Toronto, the late Sir James Whitney announced that a commission would be appointed in the near future to investigate the vexed question of medical education and to enquire into the claims made by members of various cults, who are constantly clamouring for legislation to give them recognized standing. The enquiry covers a large field and the report of the commission will be awaited with interest.

NON-MATERIALISM IN MEDICINE

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I WISH to draw your attention this evening to certain subjects intimately related to the theory, the teaching and the practice of medicine on which I believe that sufficient stress is at the present time not being laid. It is perfectly true that during the second half of the nineteenth century, owing to the successful study of biological problems by the methods characteristic of chemistry and physics, a school of thought arose in Europe—and most prominently in Germany—which claimed that it had eliminated from the concept “vitality” all factors which were not derivable from purely physical considerations. But the assertion that biologists and medical men are essentially materialistic in their outlook on life is by no means of recent origin. It was said long ago—*Tres medici, duo Athei*.

The study of medicine is an applied science—science or knowledge applied to the recognition, the prevention, or the cure of human disease.

Now I am not going to take you over the region of the arid controversies between men of science—pure or applied—and men whose main concerns were in the spheres of religion and of the mind, for those controversies date back almost to the beginning of the Christian era; but we may assert on surveying those controversies that, as a matter of fact, the greatest men of science—the leaders, the pioneers—have not been irreligious men. My learned friend, Professor Walsh, M.D., D.Sc., LL.D., of New York, has pointed out how many distinguished physicians of the middle ages were devout members of the Roman communion; but to come at once to modern times, we find as a matter of common knowledge that Newton, the prince of men of science, was a devout Christian; Stephen Hales was a clergyman, Dalton was a member of the Society of Friends; Faraday was a devout dissenter (a Glassite); Sir James Simpson was a truly religious man, Lord Lister an earnest

An address delivered before the Medical Society of Nova Scotia at Amherst, July 7th, 1915.

member of the Society of Friends, and Lord Kelvin, as I have just been reading, was an eminently reverent Scottish Episcopalian. Most of the minds of the first order in science—including under that term the applied science of medicine—have not only not been atheists, they have been reverent, devout, religious men. But I have no intention of detaining you on the general topic of science and religion, I wish to come down to a subject of considerable importance to medical thought—the reality of consciousness, of the mind, being a cause of bodily activity.

Certainly it was one of the legitimate deductions from the line of thought of the German school of materialistic physiology to which I have alluded, that there could be no room for any mental activity as an effective cause.

Helmholtz, one of the most brilliant of this band which included DuBois Reymond, Ludwig and Brücke, was closely connected with the discovery of the great generalization as to the indestructibility of energy and the transmutation of energy. In arriving at this generalization, nervous energy, nervous activity, nerve-impulses were deliberately left out of account.

The transmutation of chemical (potential) energy of the assimilated food into the various kinetic forms of muscular movement, heat, etc., was found to be susceptible of such accurate, quantitative, calorimetric treatment that a balance-sheet was drawn up (as for instance by Rübner) showing that, statistically, nerve-energy did not enter into the problem at all.

The equation expressing the quantitative relationship between chemical energy, motion and heat was apparently satisfactory without taking into account any such process as the passage of nerve impulses, far less the storing up of neural energy and the paying of it out to maintain tissue tone. Nerve-energy even now finds no place in the academic text-books; it is all right as drawing-room physiology; but the term has hitherto been regarded as the property of quacks of all sorts, "electro-biologists" and the holders of certain apocryphal American medical degrees. But without at present pursuing the question as to whether nerve-energy should be or can be included in the energy equation of the living body, we have, we find, to establish the prior claim for nerve-energy to be regarded as a separate real existence at all. Some of us believe that the nervous system is dynamogenic, and if so, that mental states must be veritable causes or causal conditions.

Even before this problem is attacked there is one more fundamental still, the general relations of mind to matter.

We have on the one hand the metaphysicians who, holding that mental states are all that is real, yet deny that a mental state can ever act upon a bodily tissue, who hold that the relationship of these, whatever it is, is never one of cause and effect; and on the other hand we have the materialistic physiologists who know nothing of any specific kind of energy called neural, and utterly deny that consciousness is a real existence and therefore capable of being a cause in the same sense that matter is.

Somewhere between these extremes come ordinary thinkers who firmly believe that nerve energy is as real as any other kind of energy, and that states of mind are as really causes as any other existences to which that term is allowed. We always have spoken as though mind could act on body and body on mind; as though the emotion of shame did really accelerate the heart and dilate the blood vessels, as though the "idea" that a patient was to get well helped him to do so, that the notion that a man was incurable helped to depress the activity of the bodily tissues, and so on. It is to say the least of it unsatisfactory that the average intelligent physician should be found to be holding views on such important subjects as the relations of mind to matter and the reality of nerve energy which according to most philosophers are not only indefensible but absurd.

There are really three schools of thought in regard to the relationship between mind and matter:

1. That consciousness is an epiphenomenon or bye-product of cerebral activity, bearing to the activity of the brain the same relation that the whistle of the steam-engine bears to the working power of the machinery: Epiphenomenalism, with which the name of Huxley is associated.

2. That the two sets of phenomena—mental and cerebral—run parallel courses; but that the psychical cannot "act on" the physical, cannot be the cause of any physical activity, nor can the physical act on the psychical (Parallelism).

3. The plain man's view, as it has been called, according to which mind acts on matter and matter on mind. (Interactionism.)

I suppose all medical men are interactionists without knowing it, just like Mons. Jourdain, in Molière's play, who had been speaking prose all his life without knowing it.

Now medical men seem eminently justified in thinking as they do. Is there not a growing science of psychotherapeutics? Do we not all believe in hypnotism as the influence of mental states over bodily? Do we not hear daily of auto-suggestion? The

whole tendency of modern medicine is increasingly to recognise the importance of the psychical: "Personality is the only real thing in the Universe," says Dr. J. S. Haldane, of Oxford, in a recent course of lectures at University College, London, the home of a materialistic physiology. The dissociation of personalities; dual, triple and multiple personalities, are commonplaces of the psychological analysis of the present day. A conscious and a subconscious mind or subliminal self, an ego and an alter ego, are now accepted as almost beyond the realm of hypothesis. The subject of psychical research has engaged the attention of some of the most eminent men of science of this and the preceding century, *viz.*, Professor James, of Harvard, Sir William Crookes, Sir Oliver Lodge, Sir W. F. Barrett; other presidents of the Society for Psychical Research have been F. W. H. Myers, Professor Sidwick, the Right Honourable A. J. Balfour, Andrew Lang, and Professor Bergson of Paris.

It is, however, I repeat, very unsatisfactory to be told by the philosophers that these things are appearances only; that mind not only does not but *cannot* act on body, nor can the body act on mind, when all the time we see, apparently, both these interactions proceeding continually before us. And if we, the orthodox practitioners, are in this outer intellectual darkness, what must be the state philosophically of those persons known as "faith healers" and "Christian scientists", whose whole position is that the mind can profoundly affect the body even to the extent of dismissing the existence of bodily pain: these persons must be lost indeed.

While the gulf gets wider between the medical interactionists and the philosophical parallelists, a school of medical psychologists has arisen in Vienna under the leadership of Dr. Sigismund Freud which takes into consideration not only conscious but unconscious states as causal. By what is called psycho-analysis, Freud has discovered that many dreams and many cases of hysteria are produced by the emergence of some subconscious state into the conscious level—a subconscious state usually of a disagreeable kind that had on that account been suppressed.

According to Freud all our mental states have emotional colourings; those that are pleasant are fostered or retained, those that are unpleasant are suppressed or relegated to the subconscious realm. In conditions of relaxed attention, sleep, illness, fatigue, etc., the subconscious emerges into the conscious and there, as a real cause, is responsible for the imagery of dreams, the characteristics of hysteria, as well as all sorts of inadvertencies, mistakes, slips of the pen and tongue. A great deal of hysteria, according to

Freud, is the result of some one or more suppressed because disagreeable mental experiences working away in the subconscious realm, with results that are disastrous to the health of the central nervous system. One can readily see that here we are on ground common to psychology, ethics, religion and philosophy—certainly the region of the non-material in medicine; this is one of the latest findings of medical science; it is distinctly non-materialistic, and it recognizes the psychic as casual. There is a good article on Freud in the *University Magazine* for April, 1915.

The physician should be more than ever versed in psychology, not only to comprehend the phenomena of undoubted insanity, but in order intelligently and effectively to apply the methods of psychotherapeutics which, although caricatured by "cranks", are based on vital and important truths. In exactly the same category stands hypnotism, a valuable therapeutic condition if rightly employed in suitable cases. "Personal magnetism," the influence of the physician's character, has no meaning if the mental is not causal.

I have no desire to add a single subject to the already large number in the medical curriculum, but I do think that between the physiologist, the professor of medicine and the lecturer on insanity, some instruction might be given on the influence of mind on body and body on mind. It is because I believe that this instruction should be given, that I think it unfortunate I should have to tell my students that many psychologists hold there is not, and there cannot be, any such interaction whatever. This tends to mental confusion. For a much fuller examination of this subject I can refer you to my article, "Consciousness as a Cause of Neural Activity" in the *Hibbert Journal* for January, 1913.

The subject of the causality or non-causality of the mental or the non-material is so important that we must examine it from as many points of view as possible. Luckily some of these methods are experimental; there is, as you know, an increasing demand for evidence which is not introspective but objective in character.

The first case is known as Sherrington's dog, an animal which had its neuraxis cut in the high cervical region when it was nine months old. It was noticed, when it had grown up, that it showed quite a conspicuous amount of emotion, just like a normal dog, the expression of the emotion, anger, for instance, being of course restricted to the regions of the head and neck. The interest of this case is that it disproves a view of the origin of emotion put forward by the late Professor James of Harvard. James' view was that

emotion was not primarily a mental state but a bodily—that is to say, a person felt the emotion of shame because his blood-vessels were dilated, his blood-vessels were not dilated because he experienced the emotion of shame. James regarded emotion as due to a reverberation into the mind from certain altered states of the periphery; whereas, of course, the prevailing view is that emotion is primarily a mental state which, through the cerebrum, acts on tissues at the periphery and alters them so as to express the emotion.

On the orthodox view the mind is causal, on James' view the periphery is causal. James' view is an interactional one, but of this kind, that body influences mind, whereas the usual view in the case of emotion is that mind influences body.

Now Sherrington's dog upholds the old as against the new view. If the periphery were causal as the source of emotion, this dog ought to have had little or no emotion since so very large an area of its periphery was severed from all connexion with its brain. The dog had very little intact periphery from which there could be emotional reverberation. But it seems to have had as much emotion as an ordinary dog, although it had only its head and neck whereby to express it. Prof. Sherrington, after a long study of the animal, was quite convinced that its emotional behaviour, so far from being minimal, as is required by James' theory, was quite normal. If its emotion was not peripherally originated, it must have been centrally originated which is the usual view. The essence of this view is that the mental states are causes of bodily changes, such as dilatation of vessels, altered heart-beat, vomiting, peristalsis, and so forth.

Sherrington was convinced that the dog's emotions were not causally dependent on the contemporaneous conditions of its visceral or other periphery. To hold that they are the result of *memories* of visceral and other bodily states is to admit, in another form, the causality of the mental. James had put the cart before the horse; but he was half an interactionist all the same.

We cannot hold one half of interactionism and not the other. If the emotions can influence the body, the body can certainly influence the emotions. Because a child is happy its vessels are flushed with blood; because its skin is flushed with blood it feels comfortable and warm; because it is afraid of something it blanches; because its skin is cold it is uncomfortable. A strong, disagreeable emotion can give one an attack of indigestion, and an attack of indigestion makes one feel very miserable. Interaction between

mind and body is reciprocal. If emotion is not causal, then psychic shock is an unreality, whereas we know it is a dreaded fact.

The next experimental contribution to the causality of emotion is due to Professor Pavlov of Petrograd. Pavlov, as is well known, studied the physiology of gastric juice in dogs with certain fistulae and with an ingenious device called "the miniature stomach." Having established the fact that the paths for glandulo-motor impulses were by the vagi nerves, Pavlov early found that the dog's emotions had almost everything to do with the secretion or not of its gastric juice.

The following experience is worthy your careful consideration: A hungry dog sees the attendant approaching with some food; after the usual and peculiarly long latent period, the juice flows; on a second occasion as the attendant appears with the food the juice begins to flow as before, but now if the attendant turns round and walks off with the meat, the juice stops being secreted. These phenomena can be repeated over and over again. Here, it seems to me, we have as good a case for the causality of emotion as we are likely to get, for we have a case of J. S. Mill's "Methods of Difference" in Logic.

If A is always followed by B ($A \rightarrow +B$), and also if when A is absent, B is also absent ($\neg A \rightarrow \neg B$), then, Mill says, we may assume that A is the cause of B.

This is a logical method of universal validity; but just because the antecedent is a mental state and the subsequent a bodily state, the parallelists deny that the former is the cause of the latter, for they have previously asserted that the mental cannot be the cause of a change in matter. This seems to me scientifically dishonest. Because I do not comprehend the method whereby A is a cause of B—the how of it all,—I am not at liberty therefore to deny the applicability of the logical method of difference to this particular case.

We do not know *how* the pull of the moon on the waters of the earth is the cause of the tides, but no man of science has the slightest doubt that it is. I am perfectly aware that the same line of argument applies to volition, for instance: I will to move my hand and it moves, I will not to move my hand and it does not move. I have, however, purposely not used this case, as it is an old argument, and the very *bete noir* of the parallelists. I have thought it better to appeal to modern laboratory evidence on which so much stress is rightly laid nowadays; and something new has a force that something older does not possess; in science as well as

in that other sphere, there is efficacy in "the expulsive power of a new affection."

Pavlov virtually established that gastric juice flowed in consequence of a psycho-motor (glandulo-motor) reflex action. But this is exactly what Dr. Beaumont believed nearly a century earlier in consequence of his studies on the fistulous stomach of the young Canadian, Alexis St. Martin. The language Pavlov uses is of course not Beaumont's, but it describes exactly what Beaumont discovered. He distinctly stated that when St. Martin was hungry and in good humour the juice flowed, when he was angry (and he was a very irascible man) the juice ceased flowing, there was in fact the emotional inhibition of the glandulo-motor reflex action. No attention whatever was paid to this observation; and during the whole of the 19th century the teaching was that the mechanical presence of food in the stomach was the cause of a reflex (excito-glandular) flow of gastric juice. When Pavlov came to examine this statement he found that it was entirely erroneous. The mere presence of food in the stomach did not give rise to a flow of juice.

Pavlov distinctly proved that food in the stomach, when unaccompanied by the *knowledge* of its presence, did *not* cause the secretion of juice. If he slipped food into a gastric fistula when the dog did not notice it, no juice flowed; further if he slipped food into the stomach while the dog was sleeping, no juice flowed. In other words, a definite mental state needed to coexist with the presence of food in the stomach else the juice did not flow; the food itself was not causal nor even chiefly causal; the cause was a psychic state, the knowledge that food was to be given, the pleasurable anticipation of receiving food. The food itself, strange as it may sound, was only a causal condition of the flow of juice. It is an old clinical observation that in a person with a stricture of the œsophagus, the putting of food into the stomach by a fistula does not elicit the flow of juice, whereas if the food had been only tasted and chewed but not even swallowed, the juice flowed freely. Here we have a sensori-glandular reflex action, the sensation itself being of the essence of the cause. But a sensation is a mental state, that is, the mental is causal. This is some of what I mean by non-materialism in medicine.

The last point I wish to bring before you in connexion with the causality of emotions is their efficacy in dreams. The fact that dreams of sufficiently distinct emotional colouring can cause a person to wake up perspiring, trembling, with fast beating heart and so on, is no doubt quite familiar, but have you reflected on this, that the

mental state is here the cause of bodily states? The hallucinations which constitute dreams are, whatever else they are, mental states; and it is they and they alone that are responsible for these well-marked alterations and activities in tissues, such as perspiration, cardio-acceleration, and so on. Of course it is certain that a state of active brain tissue is the physical basis of the dream, but that does not make the emotion, the dream, any the less a cause. For all consciousness, all vitality, has a physical basis. Of course the excited central region is the more immediate cause of the impulses which give rise to the perspiration and cardio-acceleration: but the dream, emotions, or ideas caused that brain region to be excited, for the brain is the organ of consciousness; so that at some spot in the chain of events the psychic is causal.

We must now address ourselves in some detail to the problem of nerve-energy. At the outset one cannot but recognize that the nervous system deals with energy. Various forms of energy actuate its receptors, and energy is being continually distributed to the effectors—muscles, heart, blood-vessels, glands, etc. The tone of a muscle is markedly decreased in energy after its motor nerve is severed. While it is quite true that irritability is not conferred on muscle by the central nervous system but is inherent in it, as Claude Bernard proved, yet it is equally demonstrable that the tone of muscle is only maintained at its maximum by the continual advent on to the muscle of nerve-impulses through the nerves from the centres.

In other words, the centres of the nervous system *are* dynamogenic. The central nervous system does not confer power or energy on the muscle—its own internal respiration is the source of its energy—but the continual arrival of nerve-impulses is a condition for the continual exhibition of the muscular energy. The central nervous system is the source of these impulses; without them the muscles would not have tone, would not be active; by means of them the muscles can be aroused from minimal to maximal effort.

Nerve impulses therefore are a kind of energy. Now since something cannot come from nothing, these nerve impulses must have arisen from a mechanism capable of generating them, a mechanism to that extent energy-producing.

Both physicians and the public speak of nerve-energy, of high or low nerve tone, etc. Are these things mere metaphors or is nerve-energy as real a form as heat or light or electricity? Strange as it may seem, academic physiology has not up to the present moment formally admitted the reality of nerve-energy. But the

physiological psychologist, Dr. MacDougall, of Oxford, has been constrained to postulate the existence of what he suitably calls "neurine". I have, however, discovered that many years before Dr. Macdougall wrote on this subject, the eminent London physician, Dr. Hale White, suggested that as nerve-energy had a real existence it might be well to have a technical term for it, and he suggested *Neurorheuma*. This means "the flow in a nerve;" but something *real* must be flowing in nerves; nerve-impulses flow in nerves; and as we do not suppose that nerve-energy is something other than or distinct from nerve-impulses, neurine and nerve-impulses are identical.

When the principle of the equivalence of different forms of energy and of the indestructibility of energy was applied to animals it was found that, by leaving out the activity of the nervous system, it was possible to arrive at a statement of the quantitative relationships between, say, the food absorbed and the heat given out in an animal at rest during a sufficiently long time. In particular Rübner obtained very close correspondences between the potential and the kinetic energy in these calorimetric observations. But it was the first and the last terms of the transformations that were equated; no account was taken of the causal presence of the central nervous system. On the strength of these experiments it will not do, however, to say that the activities of the central nervous system do not enter into the dynamic chain at all. Since nerve-energy was deliberately left out of account in applying the law of conservation of energy to the animal body, it is philosophically unjustifiable now to declare that there can be no nerve-energy because if there were, it would break the law of the conservation of energy. It is bad physics and worse metaphysics. It is no reproach to physiologists that they cannot measure nerve-energy with as much ease as electricity. At present we can measure neurine only through its effects on muscles chiefly; but we can measure heat only through its effects on matter; we can measure light only through the depth of the shadows it throws or through its power to promote some chemical interaction.

Dr. Macdougall believes we are justified in speaking of high and of low potential in regard to neurine; who dare say that we shall never measure its magnitude? Who could have thought at the time when the rubbing of a bit of amber made it attract paper was all that was known of electricity, that there would one day arise the science of accurate electrical measurement?

The old notion that nerve-impulses were only releasing stimuli

has been given up because it was based too exclusively on the conditions obtaining in the *isolated* nerve-muscle preparation. When we study the state of matters in the intact nervous system, we find living cells as sources of continued, rhythmical, not momentary outflow of nerve-impulses, of impulses descending to the most diverse tissues keeping these in good health, in due tone. These impulses undoubtedly vary not only in intensity but in periodicity of emission: they represent energy flowing out from nerve-centres to tissues; on the analogy of electricity they have a *potential* which as yet unfortunately has not been measured. The granules of Nissl in the nerve-cells most neurologists believe to be the physical basis of nerve-energy. It is clear that energy must be flowing into the central nervous system all the time that it is flowing out. For the sound, the light and heat, etc., of the environment are transformed by appropriate end-organs into nerve-impulses which ascend continually into the cells of the central nervous system. But just as a muscle by its own oxidations is a source of heat and work, yet needs the continual inflow of nerve impulses to cause it to keep up these metabolic and dynamic transformations, so analogously, although the chemical metabolism of the granules of Nissl is the physical basis of the output of nerve-energy, the granules only metabolize properly under the influence of incoming neural energy.

All the sense organs, therefore, are pouring nerve-energy into the central nervous system, and as soon as these ascending nerve-impulses are cut off, the tone of the central nervous system is distinctly lowered, the whole individual either goes to sleep or becomes profoundly depressed; while, conversely, stimulation of the sense-organs by pleasing sounds, bright lights and a comfortable temperature visibly raises the tone of the nervous system. This incoming energy is of course entirely from without; the sun's light and heat are the ultimate cause of our nerve tone; so that for our well-being we are as dependent on the exhibitions of cosmic energy as are the flowers.

The next topic under non-materialism in medicine which I wish to bring to your notice is one in the sphere of ethics.

No declaration of the principles of medical behaviour ever yet placed before the profession is better than that said to have been composed by Hippocrates. That Hippocrates wrote it has been doubted, but the oath is always known as Hippocratic. The oath of Hippocrates is an admirable rule of conduct for the medical man.

Doubtless a much more elaborate and comprehensive declara-

tion could be drawn up, but it is questionable whether it would be an improvement on the pagan's. It is the tenor or spirit of this declaration that is important. To one detail in it I should like to draw attention—the passage which mentions professional secrecy. The translation by the late Professor Young of Glasgow is as follows:

“Whatever I shall see or hear even when not called in for medical attendance, whatever I shall come to know in the ordinary intercourse of life, which it would be improper for me to repeat, I shall keep silence regarding it. I shall hold it secret. May I, keeping this oath in its entirety, enjoy my life and art in happiness, and have credit among all men for all time. May the opposite befall me if I break it.”

This injunction to treat as confidential what the patient may reveal to us has been scrupulously observed by many generations of medical men. But I have reason to believe that this wise provision is not so carefully observed here as it should be. The profession will pardon my being outspoken in this matter. I have had to listen to quite a number of complaints from patients and their friends as to the way in which their cases have been discussed in assemblies of laymen, in clubs and in general society. Now no one will maintain that this is as it should be, indeed it is diametrically opposite to what should be. While I think the suggestion I once heard that there should be a chair of Medical Ethics at Dalhousie University perfectly absurd, even if funds were available for such a purpose, yet I do believe that the young men, for whose training we are responsible, should have such examples of propriety in this respect put before them that the last thing they would dream of would be to betray any patient's confidences. The form of Latin oath which is taken by the graduates in medicine at Dalhousie University is evidently based on the Hippocratic. As it is possible that owing to its being in Latin, its full import has not been appreciated by some who have subscribed to it, I give it in the translation kindly made for me by Professor Howard Murray:

“I, who am now on the point of having bestowed upon me the title of Doctor in the Profession of Medicine, do in the presence of Holy God, the Searcher of Hearts, promise that I will continue in the performance of every duty pertaining to a grateful heart towards Dalhousie University up to the latest breath of my life. Then, further, that I will practise the Profession of Medicine carefully, virtuously and honestly, and, as far as shall lie within my power, will give faithful attention to all things which may contribute towards

the restoration of the sick. And, finally, with regard to matters seen or heard in the practice of the healing art about which secrecy ought to be maintained, that I will not divulge these without serious cause. As I promise these things may the Deity vouchsafe to me His favour and assistance."

I am quite aware that under certain circumstances, moral or medico-legal, certain professional secrets may have to be revealed at the proper time and to the proper person, but this sort of thing is quite other than discussing cases in lay society as one discusses the war or the weather. Nor are the laity blameless in this matter: if they do not wish their cases discussed in general society, they ought to be very careful not to request information to which they have no claim. "Oh, Doctor So-and-So, what is wrong with Mr., Mrs., or Miss So-and-So?" is an exceedingly reprehensible form of question. You might just as well call on his banker and ask the amount of Mr. So-and-So's bank-balance.

The last aspect of my subject is the notion that science and especially the medical sciences lead of necessity to a materialistic view of life; to one in which the contemplation of moral and physical beauty is wholly subordinated to the search for physical truth.

It is contended that since it is the office of all science to reduce facts to law and order, that science is necessarily in opposition to everything that is still mysterious, intangible, non-material or not as yet accessible to mathematical treatment. I can discover no mind of the first order in science at any time since the Renaissance which could be called irreverent or irreligious. Paré, Descartes, Pascal, and in our own time Pasteur, all of them minds of the first order, were to the end of their days loyal sons of their church. I am not thinking of minds of any rank below the highest: the character of the cabinet of a nation is not deduced from the views or the personal morals of the clerks and stenographers in the government offices. Doubtless I shall at once be told that Professor Haeckel is an atheist and a materialist confessed. I shall make no attempt to remove that impression; yet I would remind my critics that even he has postulated consciousness as a universal property of matter, and whatever consciousness is, it is certainly not material. But might I point out where the soulless ideals of German science have led that nation—towards the depths of the bottomless pit of infra-human cruelty.

English scientific minds of the first order have always been reverent; Dalton, the founder of modern chemical theory, was a devout Quaker; Huxley, calling himself an agnostic—itself a title of

humility—was yet a profoundly reverent man, and Darwin, his master, was certainly not irreverent.

One must judge science by its masters and not by its novices, just as we judge poetry by poets not by poetasters. The asseveration made in some quarters that science is a cold, soulless, character-destroying thing, recognizing no moral values and opposed to æsthetic and poetic instincts is a lie. I declare as solemnly as I can, that science is not opposed to the appreciation of beauty, or alien to the poetical disposition, to moral values or to the Christian religion. Is not all true science but a systematized search for truth? And "what is truth?" asks some modern Pilate. Truth is what men of scientific character search for, value, and seek to declare. Science is indeed impersonal, but it is not inhuman; for it can force a man to lay aside his predilections and even his personal comfort if they hinder him in the quest for truth.

Philosophy in the sense of science is neither cold nor proud: has she not laid all her treasures at the feet of humanity? The day has long passed when a poet could write with our approval:

"Triumphal arch that fill'st the sky
When storms prepare to part;
I ask not proud Philosophy
To teach me what thou art."

Proud only in the sense of her achievements in that she has opened the inmost treasure-house of wisdom and knowledge for the benefit of all mankind. She may indeed be proud of that: may we never, like our enemies, misuse and debase these treasures.

Instead of pride, true science, and especially medical science, teaches its student humility—humility in that he knows so little of the knowable. It teaches him patience, since there is no royal road to anything that is worth having; it teaches him steadfastness when opposed and fortitude even when misrepresented.

Science teaches us reverence for life and respect for what are called "the lower creatures;" it teaches us that a living thing is a wonderful creation. It reveals marvels of mechanism which man has but discovered and copied æons and æons after they had been in operation in animal bodies. Pulleys, levers, valves, lubricated surfaces, lenses, sensitive plates, iris-diaphragms, media as transparent as glass, the utilization of negative pressure, electric current and phosphorescence; all were in existence ages before man himself appeared.

Medical science teaches us with all the emphasis of the Great

Sheet in Peter's vision that there is "nothing common or unclean". I sometimes read the phrase "disgusting physiological details". There are none. It is not the details, but the places where certain persons have put them, that are at fault. "Dirt is matter out of place," as Lord Palmerston said, and that definition applies generally: "there is nothing either good or bad, but thinking makes it so".

Having spoken of animals let me say that men of science, yes even physiologists, contrary to the popular idea, are as fond of animals as other people. We all know about Newton's dog "Diamond"; Lord Kelvin had a favourite parrot; and Dr. A. D. Waller is inseparable from the bulldog "Jim."

Let me now tell you how a physiologist died in the service of a lower animal. My friend the late Dr. Page May, the eminent neurologist, was walking along a street in Brighton when he noticed a carter ill-treating a lame horse; he reproved the man who replied in the unrepentant blasphemy of his kind. Dr. May's righteous indignation was so roused that he went over to give him a little of the same treatment he was giving his horse, when he burst a cerebral blood-vessel and died within a few minutes. This was at any rate one physiologist who was not cold-blooded.

Medicine teaches us sympathy, sympathy with the naturally weak and with the congenitally less well endowed. Knowing the heights and the depths of human nature, the man of medical science knows how much to expect and yet not to expect too much. Understanding somewhat of the meaning of the words, "He knoweth our frame, He remembreth that we are dust," he agrees with Burns:

"Then gently scan your brother man,
Still gentler, sister woman."

If anyone may, the man of science may, hold with a good conscience that "to know all is to forgive all."

Now in conclusion as to the non-material I am going to be very bold and declare that medical science is in no way incompatible with a full appreciation of beauty. Keats declared that Newton by his mathematical explanation of the colours of the rainbow, had destroyed its beauty. Keats here is surely wrong. To the physical beauty of the rainbow, Newton added the intellectual beauty of a rigid, scientific explanation. The search for facts can perfectly well go hand-in-hand with that for beauty: because I study the histological details of the hexagonal pigmented layer of the retina or the intricacy of the organ of Corti, I am none the less alive to the

matchless beauty of detail in these wonderfully constructed mosaics. As we stumble on in the darkness of ignorance after the morning star of truth, we are ever and anon comforted with precious glimpses of an order of things where beauty reigns. Goethe once said—"See one fine picture, read one fine poem, hear one fine piece of music every day"—and I venture to assert that if that advice had been only attempted to be followed by his countrymen, the cataclysm we are witnessing on the continent of Europe would have been absolutely impossible. Of all the spirits suffering in that terrific catastrophe, surely the spirit of beauty is the one most tortured. "Oh, spirit of beauty, descend and abide here"! is the watchword of culture; and it is no empty shibboleth; but whatever cult cannot say "amen" to it is no form of culture whatsoever.

But I am going to be bolder still and assert that no science, not even medical science, is opposed to poetry—contrary as this is to the popular belief. Coleridge said it *was* science that was opposed to poetry, that poetry was the antithesis not of prose but of science. I find myself again differing from an eminent philosophical authority. If "the devout astronomer is mad", the unpoetical man of science is incomplete. May I remind you that some of our truest poets have either been medical men or have had some medical training, for instance Dr. Donne, Sir Thomas Browne, Goldsmith, Akenside, Erasmus Darwin, Keats and Oliver Wendell Holmes. Nor are poets wanting even in our own prosaic day. The well-known man of science, Sir Ronald Ross, only a year or two ago published a book of spirited verses.

Finally, to sum up, I would say that true science is not opposed to Christianity as distinguished from Ecclesiasticism, nor does it fail to recognize moral values. Its influence rightly exerted is not irreverent, cold, unsympathetic nor destructive of character. The love of science is compatible with a love of beauty and with the poetical disposition. Just as the test of a religion is the ability of its believers to die for it, so are martyrdoms by no means unknown in the records of scientific discovery. Science's worshippers, too, can endure hardship; they know full well the trials of the ascent of that intellectual Pisgah from whose summit even they can hope to gain only a glimpse of the Promised Land. Are there not martyrdoms in the annals of the scientific faithful? We know that there have been trials far more terrible because more subtle than the stake or the rack, fiery trials which have been endured only through the hope of attaining to some discovery more beneficent still—the fadeless crown of the life of the searcher after truth.

A CASE OF LARGE CELLED SPLENOMEGALY*

(GAUCHER TYPE)

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IN 1882 Gaucher described a case of splenomegaly, in which the presence of numerous large cells was demonstrated in the spleen. Since this date about twenty cases, in which the clinical and pathological findings were identical with those in the one described by Gaucher, have been reported by various writers. The more recent writers on the subject, including Marchand, Schlagenhauser and Risel, agree in the opinion that in these cases we are dealing with a constitutional disease, chiefly affecting the lymphatic and hæmo-poietic organs. The condition is of special interest in view of the controversy which has arisen in relation to the origin and nature of the large cells and the absence of any definite ætiological factor. The case which we are reporting was admitted into the Toronto General Hospital under the care of Dr. Bruce on February 6th, 1911.

H. E. R., male, aged forty-six years; married.

Family history. It was difficult to obtain any definite family history. The parents had both lived until over sixty, and the brothers and sisters of the patient are all alive and in good health. We have not been able to discover whether he is of Jewish extraction or not, but think it likely.

Personal history. The patient was born in Ontario, but had

*This paper was presented at the meeting of the American Association of Pathologists and Bacteriologists in Chicago, April, 1911, and a few weeks later at the Inter-urban Surgical Club, Montreal.

also lived in New York State and Southern California. He was not in the habit of using alcohol or tobacco. Some years ago, when in Mexico, he suffered from tertian malaria, from which he subsequently recovered, and twenty-two years ago he had facial erysipelas. He states that he is a Christian Scientist, and has therefore taken no medicine of any kind for years.

Present illness. The patient states that he has not felt well for the last ten years. About three years ago he first noticed swelling of the abdomen, and on palpation a tumour was felt, extending as low down as the umbilicus. He has since suffered from occasional attacks of numbness in the legs. The tumour gradually increased in size, and six months ago he began to feel tired and weak, and also depressed and irritable. At this time the skin became bronze in colour. He has had one or two attacks of swelling of the legs, and during the last six months has been unable to walk any distance owing to weakness and lassitude, which progressively became more marked. There have also been occasional attacks of nose bleeding. He states that he is unable to lie on the left side or back on account of a dragging sensation in the abdomen. He has suffered from gastric distress after food, and this has prevented his taking much nourishment.

Physical examination. On admission to the hospital he was seen to be a well developed, but poorly nourished, man. He exhibited diffuse bronze pigmentation of the skin, and prominence and distension of the abdomen, which were most marked on the left side. On palpation a large abdominal tumour could be felt, extending in a downward direction to the pelvis, and three inches to the right of the median line. Its surface was smooth, and it moved slightly with respiration. It was dull on percussion, the dullness being continuous with that in the left hypochondriac region.

The heart was displaced 4 centimetres to the right, but was otherwise normal. The lungs were also normal, and the liver not enlarged. The muscular, glandular, and nervous systems were normal.

The urine gave an acid reaction, and the specific gravity was 1030. It showed a trace of albumin and a moderate amount of urobilin, but no sugar, acetone, or bile.

Examination of blood. Red blood corpuscles 3,500,000; white blood corpuscles 4,800; hæmoglobin 65 per cent. Sahli. There was slight poikilocytosis, and a few microcytes and macrocytes, but nucleated red cells were absent, and there was no polychromatophilia or stippling.

Differential count.

Polymorphonuclear leucocytes.	44 per cent.
Small mononuclear lymphocytes. . . .	42 per cent.
Large mononuclear lymphocytes . . .	8 per cent.
Eosinophiles.	5 per cent.
Mast cells.	1 per cent.
Colour index.	0.9

A diagnosis of splenic anæmia was made from the above findings, and splenectomy accordingly advised. The operation was performed on February 7th, by Dr. H. A. Bruce.

At the time of operation examination of the liver showed slight enlargement, but no ascites was present. The patient made a good recovery from the operation, the bronze pigmentation of the skin became less marked, and he stated that he felt that he "had a new lease of life." On the day after operation the blood exhibited the following condition.

White blood count. 11,040

Differential count.

Polymorphonuclear leucocytes.	76 per cent.
Large mononuclears.	13 per cent.
Small mononuclears.	7 per cent.
Eosinophiles.	2 per cent.
Basophiles.	2 per cent.
<i>Red blood count.</i>	3,200,000
Hæmoglobin.	65 per cent.

The proportion of red corpuscles remained the same as before the operation. The patient was discharged from the hospital on February 26th, when examination of the blood showed:

Red blood corpuscles	4,100,000
White blood corpuscles	9,400
Hæmoglobin.	65 per cent.

This last examination of the blood showed, as compared to the previous examinations, practically no change in the differential count or the qualitative changes in the red corpuscles.

Clinical summary. Male aged forty-six, of probable Jewish extraction. Other members of the family are well, so far as could be ascertained. Had tertian malaria twelve years ago, and for the last ten years has not felt so well as before. The chief symptom during the last two years has been the enormous enlargement of the spleen. Other symptoms, which developed more recently,

were marked weakness, bronze pigmentation of the skin, loss of weight, epistaxis, and a moderate degree of simple anæmia, with leucopænia. Splenectomy was successfully performed. The patient made a good recovery from the operation, and at the time of publishing this article, he is enjoying good health.

Pathology. The gross examination of the spleen showed the following conditions: weight, 5200 grammes. Its surface is smooth, and it is moderately firm in consistence. Palpation reveals the presence of several small and irregularly scattered nodular areas. On section the general colour of the organ is seen to be a light reddish grey, the nodular areas above referred to being of a greyish colour, and of firmer consistence than the surrounding tissue. They vary in diameter from 0.5 to 2 centimetres. On close examination numerous small greyish white points and lines are visible. Scattered areas exhibit a deeper red colouration, and in these the surface is granular, and shows numerous structures resembling blood sinuses or vessels, which project slightly from the surface.

Histological examination. Tissues were preserved in 10 per cent. formalin and Zenker's fluid ten minutes after the removal of the spleen. Smears from the cut surface were also made, and the cells examined in a fresh state. Risel has demonstrated that the cells in sections of formalin-fixed tissue, when examined in water, show the same characteristics as fresh cells, and our experience confirms this opinion. These preparations show the presence of numerous large and somewhat irregular polygonal cells, exhibiting a glistening hyaline appearance. They occur sometimes in masses corresponding to the greyish white deposits of various sizes mentioned above, whilst in other areas they are deposited in the pulp in small circular or longitudinal alveolar cavities, often enclosing cells which have desquamated, together with blood. These latter areas correspond to the deeper red granular areas referred to previously. In some of the cells small granulations are present, but in the very large cells these have disappeared. These larger cells exhibit a fine streaking, and appear to contain an indistinct crystalline substance. Their nuclei are round and comparatively small, and situated at the margin or in the centre of the cell. Many of them are multinuclear, and contain three, four or more nuclei. There is a conspicuous absence of mitotic figures. Occasionally the cell bodies show processes or prolongations. In many of them a brownish yellow pigment is deposited in the form of fine granules or irregular rods. This deposition of pigment is less in the more solid areas, and very marked in the cells filling and lining the blood

sinuses. The characteristic homogeneous stratified masses are best seen in those cells which do not contain pigment. An occasional red blood corpuscle occurs in their cytoplasm.

As Risel has pointed out, the condition does not appear to be a true hyperplasia, but is chiefly due to a deposition of some foreign

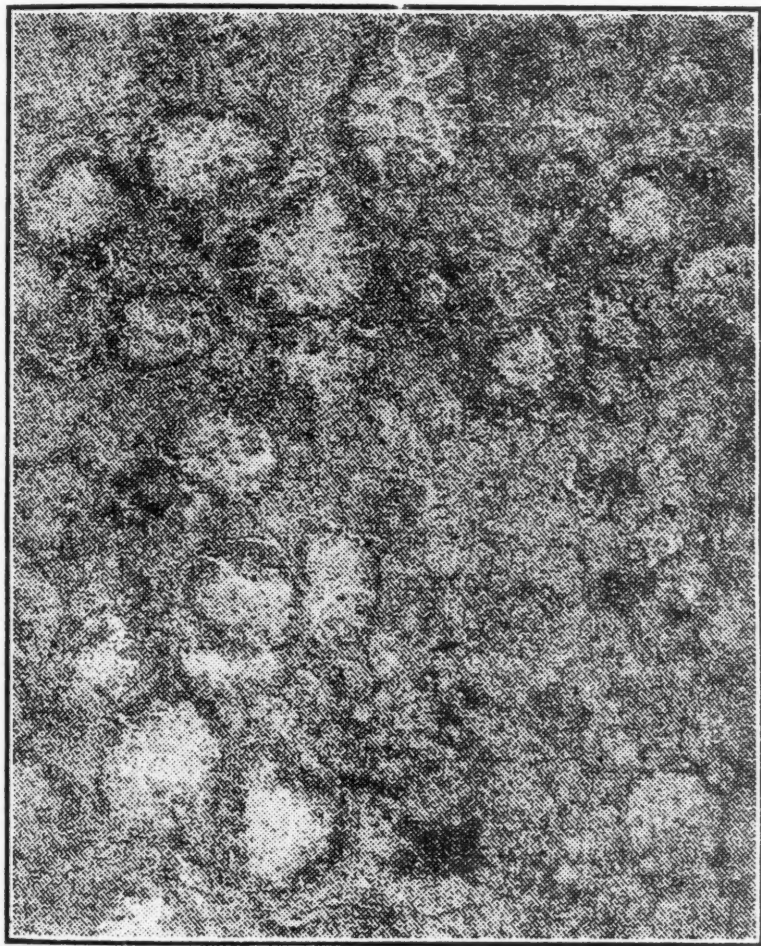


Fig. 1 x 140—Shows general type of reaction in spleen.

substance in these cells. The methods which we have used for investigation into the nature of this substance from a micro-chemical standpoint are identical with those employed by Marchand and Risel. Stains for fat, glycogen and amyloid were negative. With Millon's reagent the cells stained a brownish red. When

treated with acids and alkalies there was no perceptible change in their protoplasm. With treatment with alcohol, ether, chloroform, xylol and acetone they became more transparent and assumed a vacuolated appearance. In the digestive experiments carried out by Risel it was found that the nuclei disappeared within twenty-four hours with pancreatic digestion, but that digestion of the cells themselves was not complete for eight days. With pepsin digestion the cells disappeared completely within forty-eight hours.

Sections of material fixed in Zenker's fluid were stained by eosin and methylene blue, Mallory's connective tissue stain and Mallory's phosphatungstic acid hæmatoxylin. In place of the normal arrangement of follicles, trabeculae and pulp, the connective tissue is seen to extend into the other splenic tissue in the form of radiating bundles, which spread out into a delicate reticulum, that is closely related to the large cells. The splenic tissue contains very few lymphoid follicles. The splenic pulp is completely replaced by numerous large pale-staining vacuolated cells, sometimes surrounding alveolar spaces, but as a rule occurring, in solid masses closely packed together. The alveolar spaces are irregular in size and shape. In some places they consist of narrow fissures. In other areas they are larger, and contain moderate numbers of red blood cells, and quite a number of large cells, which lie perfectly free in their lumina. These spaces are circumscribed by delicate connective tissue fibres, which support a few longitudinal flat cells, often having a projecting nucleus. The large cells related to these are less vacuolated and somewhat smaller than those which are free in the lumina.

The large cells appear as clear structures of irregular size and shape. As a rule they are round, oblong or polyhedral, and sometimes exhibit short processes. Their contour is often wrinkled, and looks as if shrivelled. They measure from 20 μ to 40 μ in diameter. With eosin and methylene blue the nuclei stain fairly well, but the protoplasm stains faintly. The latter is large in amount, semi-transparent, and frequently shows vacuolation. The nuclei are irregularly distributed, small and frequently multiple. In the larger cells they are usually situated at the periphery. The finer details of the cell structure are best shown by Mallory's phosphatungstic acid hæmatoxylin stain. With this stain, it appears that the characteristic vacuolated and honey-combed appearance of the cell bodies is due to a delicate network of fibres, which stain more deeply than the remainder of the cytoplasm. As a rule these exhibit a somewhat concentric

arrangement, but may also occur as radials or stripes. The vacuoles vary as to size, shape and number in individual cells, the largest cells generally containing the largest and the greatest number of vacuoles. In the protoplasm of some of the cells there is a considerable amount of brownish granular pigment, which occurs in

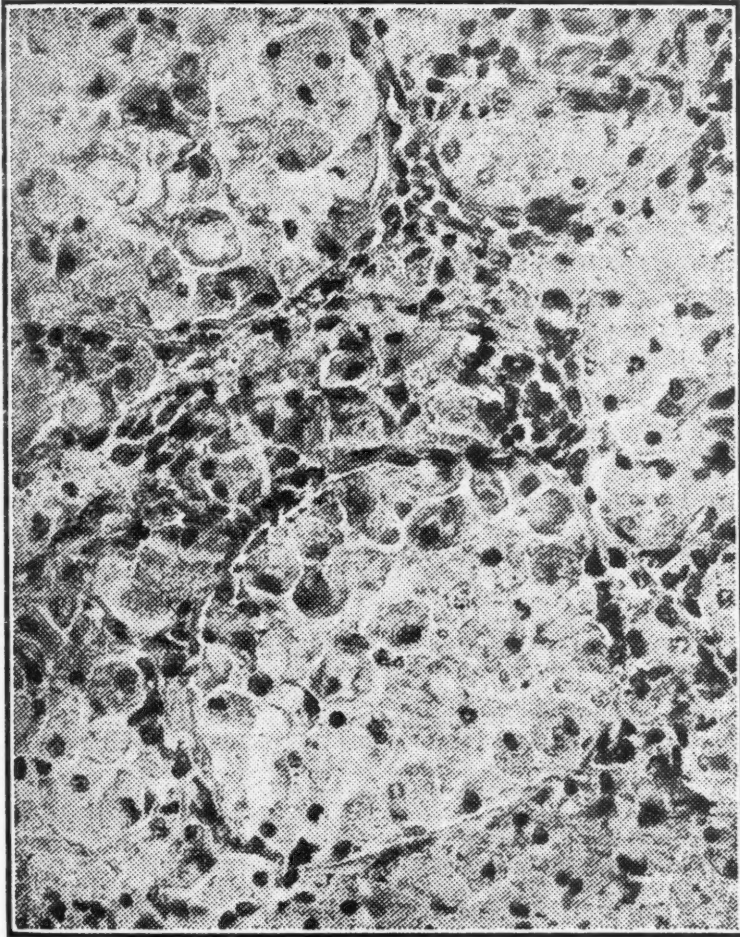


Fig. 2 x 375—Shows alveolar spaces, lined with endothelial like cells, some of which are free in the lumen.

the largest quantities in the cells lying free in the sinuses, and gives the ferric reaction.

There is unquestionably a close connexion between the large cells and the delicate reticular fibres which pass between the cells

into the cell-nests. Risel found this connexion more marked in the bone marrow.

The few lymph follicles present are irregularly scattered, but as a rule arranged in the ordinary manner. Their supporting connective tissue is scanty and extremely delicate. No large cells are observed in them. Other smaller and isolated aggregations of lymphoid tissue are present between the masses of large cells. Eosinophiles occur in varying numbers in the blood sinuses and throughout the more solid areas.

In the cases in which a complete examination of all organs has been possible the following pathological conditions have been present. Some groups of lymphatic glands are enlarged, and show the same changes which have been described in the spleen, the perigastric and retroperitoneal glands in the neighbourhood of the spleen exhibiting the most marked changes. The inferior retroperitoneal, mesenteric and axillary glands are only slightly involved. In the bone marrow also cell bodies resembling those in the spleen and lymphatic glands are present. They are seen in the whitish spotted foci of the sternum or the epiphyses of the long bones, and also in the larger whitish or yellowish foci in the diaphysis of the femur. The large cells are absent in sections taken from the tonsil and through Peyers' patches in the intestine. The entire intestinal wall, from the muscularis mucosa to the peritoneum, contains large quantities of brownish pigment.

In the liver the hepatic tissue itself is but little altered. There is, however, a moderate increase in the inter-acinous connective tissue, in the meshes of which a few of the characteristic large cells are present. These cells are also observed in the large and small branches of the portal vein, in which post-mortem clot is present. The wall of the portal vein shows no cells, but they are present in the peri-portal connective tissue.

The lungs are practically normal. The kidneys are also normal, except for a deposit of brownish granular pigment in the connective tissue between the descending tubules in the medulla.

The brain is normal. The pancreas shows pigmentation of the vessel walls, but no large cells. Risel in his case observed in the thyroid a collection of large cells resembling those in the spleen. There was extensive extravasation of blood in the muscles of the thigh, together with a proliferation of connective tissue between the muscle bundles, which frequently contains brown pigment.

Various views have been advanced by writers in relation to

the process at the base of this disease, namely, epithelioma, endothelioma of the spleen, endothelial hyperplasia, and reticular proliferation in the lymphatic system. Gaucher himself regarded the cells as epithelial in origin, and the condition as a primary epithelioma. Targett, Newton Pitt and Shattock, who discussed



Fig. 3 x 759—Shows characteristics of large cells.

Collier's case at a meeting of the Pathological Society of London, refer to the endothelial character of the cells. Bovaird, Brill, Mandlebaum and Libman regard the condition as an endothelial hyperplasia. Schlagenhauser thinks that there is little resemblance between the large cells and the endothelium of the vascular sinus.

He has also noted that the endothelial cells of the sinuses frequently contain blood pigment, but has been unable to find any mitotic figures in them. He agrees with Cornil that the condition is due to a proliferation of the reticular tissue in the lymphatic and the blood forming organs. Marchand states that the origin of the large cells from reticular cells or endothelial cells is not improbable, but does not definitely commit himself. Risel, as a result of careful investigation, arrives at the conclusion that the large cells originate from those of the reticulum rather than from the endothelial cells of the venous sinuses. Josselin de Jong and Van Henkelm agree with Cornil, Schlagenhauser and Risel as to their origin from the reticular tissue.

From the examination of the spleen in the case reported above, the histological findings would suggest to us that the large cells are of endothelial origin rather than of reticular origin. There seems to be in some areas evidence of a gradual transformation of the spindle-like endothelial cells lining the blood spaces into the large cells, which often lie free in the spaces. In the examination of formalin sections, unstained and mounted in water, we found that in some areas both the large cells and the spindle-like endothelial cells lining the sinuses contained the brownish yellow pigment. In conditions where there is rapid proliferation of endothelial cells there are nearly always mitoses in some of these cells. Owing to the fact that this disease runs an extremely chronic course the absence of these mitoses is easy to understand.

Weidenreich has shown that the reticulum of the spleen is cellular in character. The close relationship of this reticulum to the cells in question is in favour of their origin from it. On the other hand there is no definite evidence of transition between the reticulum and the large cells.

As regards the origin of the pigment, which is so abundant in the skin, spleen, lymphatic glands, bone marrow, and the smooth and striped muscle, we may point out that in our own case, as well as in those reported by Brill, Schlagenhauser and Risel, no arsenic had been previously administered to the patients. This fact excludes the assumption of arsenic melanosis as an explanation of its presence. In view of the fact that this pigment gives the ferric reaction it is probably due to hæmachromatosis.

Whilst the majority of investigators agree in the opinion that some specific foreign chemical substance is deposited within the large cells, the nature of this substance is as yet unknown. Amyloid, glycogen and fat are excluded by the fact that the micro-

chemical reactions are negative for these substances. The slight proteid reaction suggests the presence of an albuminous compound. Elizabeth von Beckendorff derived it from the red blood corpuscles, and regarded it as a body closely related to the colloid of the thyroid. Professor J. B. Leathes, who made a chemical examination of the spleen in our case, found that the amount of iron present was much increased, the total amount being four grammes of ferric oxide, which is more than the total amount present in the blood under normal conditions, the latter being three grammes. He also states that a considerable proportion of this iron is present in the form of lipoids. On the other hand the total amount of fat was diminished, being only about one third of that normally present.

Various hypotheses have been advanced regarding the cause of this remarkable disease. It has been shown that in most cases the disease commences in childhood. The familial occurrence of the disease is well established, as many as four cases having occurred in one family, only three previous cases and the one now reported forming exceptions to this rule. In the majority of instances it appears to have affected individuals of Jewish extraction, and all the cases reported, with the exception of four, have occurred in females. In four or five cases there has been a history of typhoid fever several years previously. In three cases active tubercular foci were present in other parts of the body (Gaucher, Schlagenhauer and Collier). In our case there was a history of chills and fever, with a diagnosis of malaria. In one other case, namely, that of Rollys, there was a history of chills twenty years previously. Schlagenhauer believes that there is an irritability of the reticular tissue of the organs involved, due to the influence of a toxin, probably of tuberculous origin. Bovaird blames a systemic poison of unknown origin. Schridde speaks of tissue malformation, and suggests a congenital disease. De Josselin de Jong and Van Henkelm also suggest congenital developmental abnormalities as the most probable cause. We are inclined to believe that a parasite of some sort or other is probably the cause of this disease, but so far we have been unable to demonstrate the presence of any in our case.

A SPECIAL committee has been formed, under the auspices of the Anglo-Russian Committee in London, to arrange for the equipment of a complete hospital unit for service in Russia.

THE SUBCUTANEOUS ADMINISTRATION OF FLUID IN ACUTE AND SUBACUTE CONDITIONS IN INFANCY*

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OWING to a recent search of the literature, combined with the use of fluid administered subcutaneously in the treatment of the various conditions of infancy on this service, during the past four months, it was thought that a presentation of the work and results obtained would be interesting. In the administration of fluid in the cases of this series, the main object was to replace as far as possible the body fluid lost in the progress of the disease.

Quinton in 1910 advocated the use of sea water plasma, his idea being that all superior organisms had their primary environment in the sea and have retained a blood plasma whose mineral constituents are identical with those of the original seas. It is readily agreed that the original medium which exists previous to disease is necessary to all cellular life and that it is changed and deteriorated in certain affections of infancy prominent amongst which are the intestinal disturbances such as fermentative diarrhoea, decomposition, intoxications and infections. He found that with the injection of the sea water diluted he could correct the existing medium in these cases and the cells would take on a new lease of life.

McKenzie of Aberdeen, in 1912, went further and used normal saline solution and sterile distilled water, basing his results on the fact that he increased the blood pressure in the cases to which he administered the fluid and in this way brought about the desired result. In so raising the blood pressure one promotes an increased secretion of urine, thus increasing the elimination of toxins. This, then, is the opposite view to that of any particular or isolated constituent of the fluid which produces the change.

The patients to whom saline was administered in this series were those in whom there was more or less fluid loss such as

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From the Infants' Department. Service of Dr. Alan Brown.

occurred in decomposition, acute intoxications, infections and fermentative diarrhoeas. The loss of fluid was particularly evidenced by the degree of dehydration and loss of tissue turgor both of which being readily elicited or measured by pinching and raising the tissues between the index finger and thumb, in that manner demonstrating the laxity of the tissues which in reality is but an index to the amount of subcutaneous fluid present. In addition to these most prominent symptoms, the presence of a depressed fontanelle, prostration, and cold extremities indicated to us the necessity of administering subcutaneous fluid; similar to these were those upon which McKenzie made his observations.

In acute intestinal diseases by far the greatest portion of fluid lost, is by the faeces, only a small amount by the urine. This fluid lost, is mostly made up of organic salts. By metabolic observations, it has been found that the greatest loss has occurred in the sodium and potassium salts; in severe cases, this loss being as much as eight to ten times the normal output of these respective salts. Calcium, magnesium and phosphorus are lost in very much smaller amounts. In moderately loose stools, the total ash excreted has been found to be one eighth more than the normal, while in very loose and even watery stools, the ash is increased to even twice that of the normal.

The solutions used were of two kinds, viz.; normal saline and 4 per cent. dextrose saline. On account of the scarcity of the dextrose it had to be omitted and for the past two months normal saline solutions alone were used. Dextrose is the most assimilable sugar and it has been found that a combination of dextrose and saline is more assimilable than saline alone. Furthermore, the organism is known to utilize the dextrose first, before its destruction of the body protein, to produce energy and heat. In this manner it may be spoken of as a protein-saver, which clinical experience shows to be the case. In addition it carries with it a definite caloric value, viz.: 4.1 calories per gramme. In the use of a 0.9 per cent. saline we have a fluid which is isotonic with the blood, in other words, a physiological salt solution. The method of preparation is worthy of note. One tablet of sodium chloride which is equal to 1.0 gramme c.p. is dissolved in 120 c.c. of freshly distilled water. This is then filtered twice through lamb's wool, the latter being found to be better than glass wool, the particles of which had a tendency to filter through into the saline and were in one or two cases the cause of irritation of the abdominal wall producing a local reaction. After being filtered twice the saline is sterilized for forty-five minutes in the steam sterilizer and is then ready for use. In the preparation of

the dextrose saline 4 grammes of dextrose (Merck's C.P.) is added to 96 c.c. of 0.9 per cent. salt solution and then sterilized.

The following apparatus was employed in the administration of saline: A glass Erlenmeyer flask of 1000 c.c. capacity and marked accordingly, equipped with a perforated rubber cork through the perforations of which were passed two glass tubes—one long and one short—which when the flask is inverted act as a siphon. A stand was constructed which is attachable to the side of the cot consisting of a long strip of band iron about 4 feet in length, at the one end of which is a thumb screw fastening it to the upright rod, at the other end a loop to support the flask. This gives an elevation of 4 feet above the child. The glass tubing connects with a rubber tube about $4\frac{1}{2}$ feet in length with a stop cock to compress it while the insertion of the needle is being made. An ordinary hypodermic needle of medium-sized bore is employed. At one time needles of a larger bore were used with windows at the side of the needle, but these were unsatisfactory because they produced considerable trauma, and the aperture left in the skin was large enough to admit of the escape of fluid, when the subcutaneous space was filled, and the tissue distended with fluid.

When the fluid is about to be administered the flask of sterile saline solution is heated to 120° F. All apparatus except the stand being previously sterilized. The administrator's hands are then scrubbed and care is taken to keep all tubing, etc., as sterile as possible. The infant's arms are confined in such a manner as to prevent undue movement in order that the needle may not be dislodged. The site of injection is painted with a 2½ per cent. solution of iodine and the needle inserted. It has been the practice to withdraw the needle a short distance to allow of the free escape of saline into the surrounding tissues. When the flow is thus established as evidenced by the tumour which forms and enlarges rapidly or slowly, depending on the amount of dehydration present, it is safe to let the needle remain *in situ* until the subcutaneous space is filled. The average length of time consumed in administering fluid is in the neighbourhood of thirty minutes. An important point in the administration is to guard against the entrance of air into the tube. This is readily accomplished by allowing some saline to flow away before the needle is inserted. If air is allowed to be forced beneath the skin, the only resulting condition has been surgical emphysema. Where this occurs, it affects the amount of saline which can be administered.

The site usually chosen is the abdomen, for here the dehydration

and loss of tissue turgor are most evident and in addition the folds of the skin when distended by saline, allow of the administration of about 300 to 450 c.c. daily as a rule. In cases of pyloric stenosis after operation where the saline was administered to replace the loss of body fluid which is usually pronounced as the food decomposition advances, the site of injection was between the scapulæ in the loose subcutaneous tissue in that region, the infant lying with his face down and secured in that position. In a few cases the axillæ were used under the lower border of the pectoralis major muscle, to allow of the escape of the fluid into the axillary space. In one instance 750 c.c. was given at a single administration and inside of twelve hours almost all the saline was absorbed.

When the child is prostrated, the vitality low, and the circulation poor as evidenced by cyanosis and coldness of extremities, atropine sulphate subcutaneously is given, in doses of 1-1000 gr. after each hypodermoclysis. Atropine, besides being one of the most efficient respiratory stimulants, is most effective in aiding in the absorption of fluid. In a few cases where the dehydration was very great atropine was not given at first but given in the succeeding administrations when it was found that from one-half to three fourths as much more fluid could be given and that the absorption was more rapid.

The average quantity administered in this series was about 350 c.c., or over ten ounces. The indication for the amount depends entirely upon the cases on admission or when administration is begun. For instance, if an infant presents itself with marked dehydration, loss of tissue turgor, great weakness and symptoms of collapse, the indications are for the administration of fluid to the fullest capacity at intervals of three hours. In such a case the cry is for body fluid as the cells are dessicated and the sooner one restores the original medium, the sooner improvement will commence. Thus one can say that the amount and interval varies directly as the indications for such in the infant. The absorption of the saline is rather slow in some cases where the vitality of the child is poor, coupled with bad circulation and exhibition of symptoms of collapse.

Does the introduction subcutaneously produce an elevation of temperature, and if so, to what is it due? A great deal of discussion has taken place in the recent literature over this point of thermal rise after injection of fluids. The main conclusions arrived at are as follows; 1st. To use a saline made from freshly distilled water. 2nd. To use saline free from bacteria and bacterial toxins. Saline,

as commonly used prepared with distilled water that is not fresh, produces an elevation of temperature following injection. In cases of this series to which saline, made from known freshly-distilled water, was administered, no thermal rises were noted. Again, on the other hand, where saline was administered made from distilled water that was not fresh elevations of temperature were noticed. This occurred in six of the seventy-two cases. In one case notably did an elevation of temperature result, which dropped to normal as soon as the administration was discontinued. When it was resumed, the elevation was again present. In another case the resulting temperature was due to an over-dose, the larger the amount the greater the disturbance of the thermo-regulating centre. Thus the others are apparently due to the distilled water, no other cause existing in the infant's condition. Theories advanced as to the cause of the temperature are as follows; 1st. That the children suffering from intestinal disturbances are liable to have a slight thermal rise. 2nd. An action of the administration of saline upon the heat regulating centre. 3rd. A destructive change in the cell itself and a reaction to the cell change by the salt administered. 4th. The question of bacteria or bacterial toxins in the water. Bendix and Bergmann used a freshly distilled water to make their injections and in no instance had a rise in temperature. In the one case of the series where a large dose was administered the temperature was initial, i.e., after the administration and did not reoccur when the repetition of smaller doses took place. While six of the seventy-two cases were suffering from a complicating bronchitis, bronchopneumonia or blood infections, along with the intestinal disturbance, we may say that in all these cases there were irregular elevated temperatures and it is impossible to say whether or not the salines were wholly responsible for part of them.

The immediate effect of the administration in all of these cases was striking. The general condition was much improved, the toxic symptoms, except in moribund cases, disappeared in from twenty-four hours up to a few days' time. In the intestinal cases during the warmer weather, which formed the bulk of the patients in this series, to which saline was administered, the effect was very marked. An infant on admission having frequent stools, vomiting, loss of weight, marked dehydration and loss of tissue turgor invariably, unless moribund, responded in the first twenty-four hours, so that part of the symptoms disappeared and the child's general condition was improved. When, under treatment, the stools having reverted from the loose green type to those with soap formation, the de-

hydration less, the hypodermoclysis is usually discontinued. When to stop the administration comes largely as a matter of experience. One might possibly produce a salt cedema as one of the effects of administration. In but one case of our series was there a general cedema. The only localized cedema was at the site of injection in the abdominal wall itself, demonstration of which was clearly seen at autopsy, and again as metabolism cedema in one case present in the periorbital tissues.

The next striking effect was in the weight curve. In all but ten cases there was a rise in the weight curve. Those ten cases were out of thirteen which we classified as moribund on admission and in them all that was shown was the initial loss after admission, the babies having died before the next weighing day. Here we may say that the custom on this service is to weigh the babies only twice a week. The gain in weight varied from four to eight ounces at a time depending on the amount of saline administered. This increase in weight was not always maintained, it usually falling to the admission weight or a few ounces above it after the cessation of the administration of the saline. However, it is undoubted had the injections not been given, the weight loss would have been much greater and the prognosis more serious.

The effect on the tissue turgor in the very sick cases was not as pronounced at first as later on when the infants' general condition had improved a great deal. But in those cases where loss of tissue turgor was not marked the effect of hypodermoclysis was readily noticed. The very striking effect upon the dehydration was twofold; 1st, a production of a local cedema at the site, thus doing away completely with the dehydration; and, 2nd, the marked improvement of the general condition of the patient, so that, by the replacement of the fluid already lost, the dehydration gradually disappeared except in those cases which were fatal.

The following is a short summary of the cases upon which these observations were made: A total of seventy-two cases for the series, sixty-five of which were grouped as intestinal, including marasmus or decomposition, acute intestinal intoxication and fermentative diarrhoea. In these the symptoms were all much the same as remarked above. Of these sixty-five cases, sixty were admitted to the hospital with a prognosis of five in ten or less and only five with a prognosis over five in ten. In passing it might be said that a prognosis of five in ten means five chances in ten for the child to get well, this means of roughly estimating the prognosis being adopted on the service. The mortality was 58 per cent. for the entire series

of seventy-two cases, but this number included 16 which were moribund on admission, i.e., they died before being in the hospital seventy-two hours. There were three cases of pyloric stenosis suffering with severe decomposition and only brought to the hospital as a last resort, at which time it was impossible to improve their condition whatsoever. Deducting the moribund cases the death rate was only 30.8 per cent. and taking into consideration the condition of the children on admission this is remarkably low for summer cases. It might be mentioned that six of the cases were suffering from bronchitis, bronchopneumonia and blood infections, four of which died.

Five were cases of Pyloric Stenosis, three of which died, on admission four had a prognosis of less than five in ten. One was a case of intestinal infection which was cured—here the dehydration was marked in a fat baby; the response to salines was gratifying.

One case of congenital syphilis, which developed a severe decomposition and secondary anaemia from which the baby died.

In fifty-seven of the seventy-two cases there was need of saline administration on admission. Of the remainder all developed a decomposition while in the hospital necessitating the injection of saline. The intervals were three, viz., twice a day; three times a day and every three hours, all depending upon the indications. The average amount varied from 275 to 350 c.c. daily. This again depended upon the condition of the child. The largest administration was 750 c.c. and the smallest 50 c.c. There was a thermal rise in six cases, five of which were apparently due to distilled water, the other to an overdose—750 c.c. Sixty-two out of the seventy-two cases exhibited a rise in the weight curve. The remaining ten were classified as moribund on admission. In three cases there was obtained a slight local reaction and in none of these, as far as anyone could judge, did this have any deleterious effect on the progress of the case.

REMARKS:

1. The subcutaneous injection of fluid is without danger and in 71 per cent. of the cases there was observed a decided beneficial result.

2. The general indications for the injection of fluid are evidenced by loss of tissue turgor and presence of dehydration, which exists in all infants suffering from diseases which produce rapid fluid losses from the body.

3. The immediate results are evidenced:
 - a. By increase in weight, thus overcoming the rapid and frequently fatal initial loss.
 - b. By improvement in tissue turgor.
 - c. By improvement in the child's general condition.
4. It is essential that the fluid for injection should be prepared from *freshly* distilled water.

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1. *Archives of Pædiatrics*, 1913.
2. *Monats. für Kinderhk.* 1912, December 6th, p. 387.
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4. *Archives of Pædiatrics*, 1912.
5. *Münch. Med. Woch.*, 1911, November 21st, p. 2500.
6. *American Journal of Diseases of Children*, 1911.
7. *Freiberger Arch. f. Kinderhk.*, 1910, viii, Nos. 1-3, p. 7.
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DR. WILLIAM H. WELCH, professor of pathology in the Johns Hopkins University, and Dr. Simon Flexner, of the Rockefeller Institute for Medical Research, recently sailed for China to study the medical schools and hospitals in that country. The results of their investigation will be published by the China Medical Board of the Rockefeller Foundation.

THE Canadian Militia Department has authorized the organization of a Fourth Universities Company for overseas service, which will reinforce the Princess Patricia's Canadian Light Infantry. The company will be recruited under Captain A. S. Eve, of the McGill Contingent of the C. O. T. C.

The First Universities Company, under Captain Gregor Barclay, joined the Princess Patricias some weeks ago. The Second Universities Company was recruited under Captain G. C. McDonald and Captain P. Molson and is also overseas. The Third Universities Company, under the command of Lieutenant F. L. Turnbull, arrived at Plymouth September 13th, last.

THE METHOD OF DEALING WITH TUBERCULOSIS IN THE PUBLIC SCHOOLS OF TORONTO, CANADA

F. S. MINNS, M.B.

Toronto

MEDICAL inspection was begun in the Toronto Public Schools by the Board of Education early in 1910. Miss Lina L. Rogers, who while in New York developed the nursing side of Medical Inspection of Public Schools, was appointed Superintendent of Nurses. In the same year two medical inspectors and four nurses were appointed. The work of the medical inspectors and nurses disclosed such serious conditions of health that arrangements were undertaken by the Board to organize a system that would embrace all the school children of the city. In February, 1911, Dr. W. E. Struthers was appointed chief medical officer, and in March, eight assistant medical inspectors, one dental inspector, and thirteen nurses were added to the staff. One year later, February, 1912, six additional nurses, and in March, ten additional medical inspectors were added; in March, 1913, three more medical inspectors and twelve nurses were appointed to complete the medical and nursing staff. Dental rooms were equipped in four schools, and four dental chairs were installed. In April, 1913, two dental surgeons were appointed, and later two more were added. This number of dentists has been increased to thirteen. The present total staff consists of a chief medical officer who gives his whole time to the department, twenty medical inspectors who give their mornings from 9 to 12 a.m., one of whom is a special examiner for tuberculosis, one chief dental officer and thirteen dental surgeons on part time, one superintendent of nurses and thirty-five nurses on whole time.

The city is now divided into districts with a medical inspector and two nurses in charge of each district. The medical inspector and the nurses of each district are expected to obtain an accurate knowledge of the prevalence of disease, sanitary conditions, home environment, and the number of indigent families in the district. The investigation and control of positive and suspect cases of tuberculosis among school children is being carried on with the

assistance of the whole staff by one of the assistant medical inspectors specially qualified to undertake this work. The work is being developed in proportion to its importance and magnitude. All known positive cases are recorded and every exposed and suspect child is examined. The medical inspectors and nurses assist the special examiner by referring to him all exposure and suspect cases with a report of home conditions.

Extract from instructions to the staff regarding positive and suspect cases of tuberculosis.

"Cases naturally divide themselves into two classes: First, those without a history of exposure, and second, those with a history of exposure, that is, direct contact."

"All suspect cases *without a history of exposure* must first be examined by the school medical inspector, who, if he deems it necessary, will have a report sent in requesting an examination by the special examiner. Special consideration is to be given cases where an examination is requested by the parent."

"All suspect cases *with a history of exposure* should be reported and a notification will be sent stating the manner in which the case is to be followed up and examined."

"Reports of *all new* cases of suspect tuberculosis, and *all old* cases not as yet recorded with coloured stickers, should be sent in with your daily records, on the form provided. In the event of not having a form, give all the information which is thereon asked for: name of school, family name, address, names of all the children of all ages in the family, present whereabouts and condition, history of contact or exposure, agencies interested, and your signature."

"Cases, which are reported from the office of the chief medical officer and having a history of exposure, are to be examined as soon as possible by the special examiner or at a chest clinic at one of the hospitals or dispensaries mentioned in the notification."

"Cases which are examined by the special examiner or at a chest clinic will have the results of the examinations reported to the medical staff of the school as soon as possible. If the child is advised to discontinue attendance at school, the report will state this, and when advised to return to school after absence the child will be given a note to this effect."

"Cases reported by the special examiner, and no others, are to be recorded by the school medical inspector on the children's reference and physical record card with coloured stickers. These stickers are used according to a code supplied."

"Under the heading on the report, 'agencies interested,' the

following are the four principal ones: the parent or guardian, school, family physician, and any recognized charitable organization in the order in which they are to be considered."

"A record of every child examined to determine if tuberculous infection is present is kept in the office of the chief medical officer. In so far as possible the record of each family will be completed under the following heads:

Date of the special examination.

Names of all the children in the family.

Ages of all the children.

Family address.

Name of the school or schools that the children attend.

Brief history of the exposure:—family, house, occupational, time, duration, degree.

Result of the tuberculin test.

Number of the x-ray when taken.

Pathological lesions.

Diagnosis, and by whom it was made.

A note as to whether the case has been registered or reported to the Board of Health.

A note stating by whom the child was referred for examination.

A note of the child's present physical condition, and of the home and social conditions.

A note of the recommendations *re* school and treatment.

A note of the termination of attendance or treatment.

"The work of the department is carried on in conjunction with the work of the family physician, dentist, the chest clinics at the hospitals and dispensaries, the various missions, the social service organizations, and the Board of Health. From these sources reports are received and acknowledged. The work is being developed and expanded in harmony with the existing organizations in order to reach the largest number of children possible, and as soon as there is reasonable ground for investigation to bring the timely aid which will ultimately be a great factor in lessening the prevalence of tuberculosis among school children,—conservatively estimated at twenty-five per cent,—and as a direct consequence, among adults."

"Information may be obtained at any time by the members of the staff from these records."

"When the 'agency interested' is a physician the following form letter is sent to him and no further steps are taken in the case until a reply is received."

Toronto

Dr.

Dear Doctor:—

I have received a report that you are interested in the family St. The report states that the children attending school have been exposed to an infection with tubercle bacilli. We are desirous of gaining some definite knowledge regarding this infection, the control of which is one of the aims of medical inspection of public schools. We ask for your co-operation in one of three ways:—

First:—That you will send a certificate giving your examination findings, and state whether the case shows sufficient signs and symptoms to make a clinical diagnosis in the case of,

., age

., age

Second:—Or that you will express your willingness to have the children examined at school by the school special examiner, Dr. F. S. Minns, who will send you a report of his examination.

Third:—Or that you will express your willingness that arrangements be made by the school nurse for an examination at a chest clinic at one of the hospitals.

Trusting to hear from you soon in regard to this matter, I remain,

Yours sincerely,

ALEX. MACKAY,

Chief Medical Officer.

This special work has been carried on for a year and a half. During this time a large number of letters have been written to the doctors. The response in almost every case has been prompt and in all cases a ready will has been shown, to assist in the work in every way. Every doctor has experienced the difficulty of getting permission to examine all exposure and suspect cases which he meets with in his private practice and he has been found to welcome the aid which will enable him to render service to those under his care.

Contagious diseases reported to the Municipal Board of Health from all sources are daily reported by the Board of Health to the

chief medical officer. These cases are then reported by telephone, and by mail on special forms, to the principal and to the medical inspector of the school in the district in which the cases live. Cases of tuberculosis reported from the Board of Health, however, are for several reasons forwarded to the school medical inspector only. The school nurse then discovers whether there are any school children in the house with the case. If school children are found a complete record is sent in on the form provided, and where there are no school children a report to this effect is returned. The results of all examinations and the recommendations in each case made by the special examiner are reported to the Board of Health. In the case of tuberculous adults examined at the clinics at the Toronto General, St. Michael's and the Western Hospital, instructions are given to the patient that all the children exposed are to be brought to the chest clinic at the Hospital for Sick Children for examination irrespective of the presence or absence of symptoms of tuberculous infection. The results of the examinations and the recommendations made by the examiners at the hospital are reported to the medical staff of the school which the children attend. The Board of Health and the Board of Education nurses therefore receive the same information about the cases. This tends in a measure to prevent overlapping of medical, nursing, or relief work. Many new cases other than the above are continually being found by the nurses in their work in the school or while making visits to the homes, and these cases are reported to the special examiner.

The examinations made in the schools are arranged by the school nurse who gets a written consent from the parents for the examination. The nurse also endeavours to have the parent present. This is of considerable help in obtaining an accurate history and it insures the prompt carrying out of recommendations. A tuberculin test is made for each child examined,—either a Von Pirquet or a Mantoux.

Cases examined are divided into three groups: positive, negative, and cases of doubtful evidence. Cases in the third group are kept under observation and re-examined until placed in either the positive or negative group. The positive cases are sub-divided into two groups—open and closed cases. The closed cases are those which have given positive tuberculin reactions with clinical evidences of tuberculosis.

This branch, as are all the branches of medical inspection work, is carried on to help each child of school age to attend school

the largest number of days. This is possible for a healthy child only. The natural question which arises is: "What are we doing for the child who is found with signs and symptoms of tuberculosis?" The large majority of them are found to have one or more of the following more common pathological lesions, viz.: sore eyes, defective teeth, discharging ears, enlarged cervical, mediastinal or bronchial glands, diseased bones, joints, or skin, or some pulmonary involvement. Varying grades of anæmia and degrees of debility with frequently recurring colds are common conditions. In many cases treatment of the non-tuberculous conditions is the best treatment for the tuberculous. Parents are advised to take their children to the family dentist. If unable to afford to do so, the children are treated at one of the schools or municipal dental clinics. For ear, nose, or throat treatment, the children are referred to the family physician, or to one of the hospitals. The correction of these defects in many cases is all that is necessary, with the addition of general measures to improve the general health. Tuberculin treatment is advised for suitable cases and is given by the family physician, or at the chest clinic at the Hospital for Sick Children. We endeavour to have open cases among adults removed from the child, or the child from the home. A large number of closed cases are sent to the Preventorium of the Daughters of the Empire for a period of one to four months. Their education is carried on by a teacher provided by the Board of Education while in this institution. The admissions to this institution are granted at the chest clinic at the Hospital for Sick Children. The child sent to the Preventorium is one who, after repeated examinations, is considered safe to mingle with other children and to be re-admitted to school. During the six warmer months of the year, the Heather Club Chapter of the Daughters of the Empire with the coöperation of the Hospital for Sick Children are able to care for fifty children at the Lakeside Home. During this period the Board of Education also maintains two forest schools, one in Victoria Park, the owner, Mr. H. P. Echardt, having generously given the use of the grounds and buildings for the past two years, and one in High Park, a corner of which is being used with the consent of the city council. The attendance at each of the two forest schools averages one hundred. Inasmuch as the schools are intended for children physically sub-normal and presumably more susceptible to secondary infection, great care is exercised to select such cases only in which infectious pathological conditions are quiescent. Frequently it is necessary to cope with bad environ-

ment, poverty and ignorance, and here the agencies of pure air, selected diets and education, are the remedies *par excellence*. Open cases, pulmonary or otherwise, which are a menace to others are excluded from all schools, and the cases, adult or child, among the poor, are visited by the Board of Health nurses. In some instances the children are referred to the Queen Mary Hospital at Weston where there is accomodation for about eighty children.

This method of dealing with tuberculosis as it exists amongst the children in our public schools and the careful study and supervision of the individual child during school life will, it is hoped, produce good results. The statistics obtained, moreover, should be valuable to the medical profession in the general study and prevention of tuberculosis.

THE work of the Montreal General Hospital increases steadily and, since the outbreak of the war, the authorities have been obliged to refuse admission to many applicants. At one time there were as many as 407 patients in the hospital, and in the outdoor department 512 were treated in one day. An electro-cardiograph was added to the hospital equipment some time ago, and a department of massage and remedial gymnastics has been established in the outdoor department in connexion with the School of Physical Education of McGill University. The policy of the Medical Board has always been to encourage the younger men in the profession to become connected with the hospital. The wisdom of such a policy is evident: a large number of those who were on the hospital staff are now on active service but their places have been taken by others already connected with the institution and the work of the hospital has been continued along established lines without confusion.

Case Reports

CHOLÆMIC HÆMORRHAGE

By E. M. VON EBERTS, M.D.

Surgeon to the Montreal General Hospital

MADAME J., aged fifty-six years, was admitted to the private wards of the Montreal General Hospital on June 17th, 1914, complaining of attacks of abdominal pain, jaundice, and loss of weight.

For five years previously the patient had suffered from attacks of pain in the back, to the right of the median line, and localized at the level of the tenth dorsal spine. These attacks were sudden in onset, and were frequently accompanied by sweating and chills, and on a few occasions by nausea and vomiting. In April, 1914, two months before admission, jaundice developed, and became gradually more intense.

On admission the patient was found to be well nourished. There was universal icterus of a fairly pronounced grade. From time to time there was complaint of pain of a dull aching character at the right costal border. The thoracic organs were normal. The abdomen was prominent, with a very heavy panniculus. Below the costal margin, in the right nipple line, there could be felt a smooth, round, insensitive mass, which moved on respiration and was presumably the gall bladder.

Urine: specific gravity 1.036; acid; no albumin; no sugar; positive reaction for bile.

Tests of the coagulation time of the blood by the drop method showed a normal coagulation time as compared with that of the house surgeon, Dr. Holbrook.

The stools were clay coloured, and contained neutral fat. There was no reaction for bile. The amount of mucus present was not abnormal.

In preparation for operation the patient was placed on a milk diet and given a purge on four succeeding days. One drachm of calcium lactate was given by mouth.

The operation was performed on June 22nd, 1914. After a

preliminary hypodermic injection of morphine gr. $\frac{1}{4}$ and atropine gr. 1/150, anæsthesia was induced with nitrous oxide gas, and maintained with ether (open method). The gall bladder was exposed through the usual Robson incision. The palpable mass already described proved to be a process of the right lobe of the liver. The gall bladder was found to be contracted and to be densely adherent at its apex to the liver, and posteriorly to the gastrohepatic omentum. Stones were palpable through the bladder wall. The cystic duct was dilated, and in the common duct there could be felt a large cylindrical stone. After the omental adhesions had been liberated, the cystic duct was ligated at a point of marked thickening and contraction near the common duct, and the gall bladder removed. The common duct was then incised, and a stone, $2\frac{1}{2}$ cm. long and $1\frac{1}{4}$ cm. in diameter, removed. Two smaller stones were released from the lower portion of the common duct. A drainage tube was then sutured into the opening in the common duct at its junction with the cystic, and a second free tube was inserted beside the common duct drain to provide for any leakage of bile. The wound was then closed in layers.

Convalescence was uninterrupted until the sixth day after operation, when towards evening the patient was nauseated and vomited. A stool passed at this time was dark in colour, and on examination was found to contain blood. Early on the next morning (June 29th) an increase in the pulse rate was noticed; and later, hæmorrhage into the dressings. On examination there was found free bleeding from the lower angle of the wound. The stitches were removed, and the wound opened down to the aponeurosis. One spurting point in the rectus muscle was ligated. In addition to this visible source of hæmorrhage there was oozing from all tissues in the wound, from the muscle, from the fat, and from the margins of the skin. There was no hæmorrhage from either tube. The patient was given coagulose, equivalent to 20 c.c. of horse serum, and one sixth of a grain of morphine; and the wound was packed with gauze soaked in adrenalin. The blood which escaped from the wound showed no signs of clotting. The morphine was repeated every four hours subsequently.

Although much diminished, the oozing from the wound continued throughout the day, soaking the dressings and running down the flank without a vestige of clot formation. Between eight and ten o'clock in the evening it became more marked. A second dose of coagulose was given. The pulse rate had fallen from 100 to 90. At nine o'clock the patient vomited bile, which contained blood.

Death occurred at three o'clock on the following morning (June 30th). There was no autopsy.

In addition to the hæmorrhage from the parietal wound, severe bleeding evidently occurred from the mucous membrane of the stomach and from the intestinal tract.

In a case cited by Whipple in the *Archives of Medicine*, 1912, spontaneous hæmorrhages developed three months after the onset of jaundice, the bleeding appearing in the form of oozing from the mouth, blood-stained vomitus, and bloody stools. Observations upon the coagulability of the blood five days before the onset of hæmorrhage showed but a slight delay in coagulation, a delay which at the time was considered within normal limits. Death occurred three days after the appearance of the first hæmorrhage.

In another case, communicated privately by Dr. Pratt of Boston, cutaneous hæmorrhages occurred over the front of the chest of an individual who had been jaundiced for a period of two months. Death took place two months after the development of the hæmorrhages. At autopsy there was found degeneration of the central portions of the lobes of the liver, with fatty metamorphosis; hæmorrhagic areas in the skin, subcutaneous tissues, pericardium, and peritoneum; and hæmorrhage into the stomach, intestines, and bladder.

In neither of these cases was there any operative interference. In Whipple's case blood examinations after the onset of hæmorrhage showed an excess of antithrombin.

While slightly delayed coagulation time is commonly met with in association with obstructive jaundice, the administration of calcium will, in all but the cases of true hæmorrhagic disease, restore the normal coagulation time. Whipple has suggested that this is due to a binding of the calcium by the bile pigments,—a combination possessing unusual stability. In true hæmorrhagic disease, on the other hand, calcium has no effect. It is highly probable that the causative factor, namely antithrombin, is produced in excess within the liver itself. The various experiments of Morawitz and Bierich confirm the earlier findings of Alexander Schmidt; that, while the bile salts can suppress the development and also the action of fibrin ferments, they must, in order to effect this, be concentrated to a degree which is never met with in the blood; and they conclude that the bile salts circulating in the blood of jaundiced patients do not exert any striking influence upon coagulation. There is a great deal of experimental evidence in support of the belief that the liver chiefly is concerned

in the maintenance of the prothrombin-antithrombin balance. For this reason Quincke pointed out that the term "cholæmia" in connexion with hæmorrhagic disease is misleading, and suggested the term "Intoxicatio Hepatica." Pawlov and Bohr demonstrated the absence of coagulation of the blood in animals in whom the abdominal circulation had been isolated. Doyen and his pupils, observing the effects of injuries of the parenchyma of the liver, of phosphorous and chloroform poisoning, and finally of liver extirpation, concluded that the absence of coagulation was due to the injury or disease of the liver itself. Again, Morawitz and Bierich record observations upon cases of obstructive jaundice, and conclude that the delay in coagulation bears no relation to the intensity of the icterus, and that in the majority of such cases coagulability is normal. Blood tests in all of their cases of catarrhal jaundice showed no delay in coagulation time. According to Howell's theory of the mechanism of normal blood coagulation, there is sufficient antithrombin present in normal plasma to bind the prothrombin. Cell injury sets free thromboplastin, which neutralizes the antithrombin. The prothrombin thus unattached combines with calcium to form thrombin, and the free thrombin coagulates the fibrinogen, with the production of the normal clot. Whipple believes that, in those rare cases of true hæmorrhagic disease associated with profound icterus, we may presuppose the presence of some liver disorder which deranges the normal antithrombin-prothrombin balance, and states that calcium has no effect upon this condition. In the treatment of such cases the administration of serum may stimulate an even greater production of antithrombin. The one hope of permanent benefit would appear to be in the practice of direct transfusion.

THE Second International Conference on Race Betterment took place at San Francisco, August 4th, to August 8th, last. Among the speakers were Dr. David Starr Jordan, president of the Leland Stanford University; Professor Irving Fletcher, of Yale University; Mr. Edgar L. Hewett, director of the United States Bureau of Ethnology; Mr. Paul B. Popenoe, editor of the *American Journal of Heredity*; and Dr. J. H. Kellogg, superintendent of the Battle Creek Sanitarium.

TYPHOID CHOLELITHIASIS AND CHOLECYSTITIS

BY E. M. VON EBERTS, M.D.

Surgeon to the Montreal General Hospital

MRS. S., aged forty-eight, was admitted to the private wards of the Montreal General Hospital on January 23rd, 1914, complaining of distress in the stomach, flatulence, and jaundice.

The personal history was negative apart from an attack of pleurisy at the age of twenty-three.

The patient dated the present illness from October, 1912, when she had several slight attacks of pain in the epigastrium, which radiated to the right side and flank along the border of the ribs. The pain in each attack was moderately severe, and persisted for about forty-eight hours. In June, 1913, there was another definite attack; and a third in August, 1913. In none of these attacks was jaundice noted, but in the last the urine is said to have been dark in colour. In December, 1913, several attacks of distress in the epigastrium with cramp-like pain occurred. On December 26th, 1913, jaundice was noticed for the first time, and became progressively deeper.

On admission the patient was fairly well nourished, but had evidently lost weight. The icterus was general and of a moderate grade. The thoracic organs were normal. The abdomen was flaccid and resonant throughout. The liver was palpable at the costal margin in the right nipple line. Immediately to the right of the median line there could be felt a slightly tender mass,—probably the gall bladder.

Radiographic examination showed to the right of the fifth lumbar vertebra a faint circular shadow, about the size of a 25 cent piece, with well defined margins. The radiographic diagnosis by Dr. Wilkins was gall stone.

On January 28th an operation was done. When the abdomen was opened, the mass referred to above was found to be a distended gall bladder. In the cystic duct a large stone, about 2 cm. in diameter, could be felt, but could not be displaced owing to infiltration of the duct wall and the surrounding tissues. The common duct was then opened, and the obstruction was found to be

due to a stone protruding from the cystic duct. There were no stones in the common duct. The gall bladder was removed, and the common duct drained. Convalescence was uninterrupted.

On section the walls of the gall bladder were found to be rigid, greatly infiltrated, and friable. The gall bladder itself was filled with creamy pus, and contained three large and innumerable small calculi.

From the pus in the gall bladder and from the interior of two of the larger stones, Dr. Rhea obtained pure cultures of *Bacillus typhosus*. The following agglutinations were done. The patient's serum clumped her own organism and *Bacillus typhosus* from laboratory stock culture in thirty minutes, both in 1-40 and 1-80 dilutions. A known typhoid serum clumped the patient's organism in forty minutes in 1-40 and 1-80 dilutions. An attempt by Dr. Shanks to isolate *Bacillus typhosus* from the stool was not successful.

Apart from the fact that such cases afford interesting evidence of the occurrence of localized extra-intestinal typhoid infections, they are of especial importance owing to the fact that they are typhoid carriers and must of necessity be a menace to the community in which they live. Posselt, in his exhaustive article on atypical typhoid infections, deals with this condition, and reviews sixteen cases of primary typhoid infection of the liver and gall passages from whom no history of typhoid fever could be obtained or in whom at autopsy no other evidence of typhoid (such as lesions of the intestine) was found.

In the case reported, agglutination tests before operation would have enabled one with reasonable certainty to make a diagnosis of typhoid cholecystitis, and in all cases of cholecystitis and jaundice where the causative factor is in doubt, careful agglutination tests should be carried out, and the stools examined for typhoid bacilli.

THERE are now between 1,400 and 1,500 Canadians attached to overseas army medical corps. There are about 5,000 hospital beds in England and an equal number in France that have been provided by Canada, and, at the present time, Canada has five field ambulances, three base hospitals, one stationary hospital, and two casualty clearing hospitals in France, while at the Dardanelles there are at least three hospitals, and a number of Canadian doctors serving in the Royal Army Medical Corps.

Editorial

PAUL EHRLICH

IN the death of Paul Ehrlich, which occurred in his laboratory at Frankfort-on-Main, on August 20th, the world has lost one of its masterminds and one of its most prolific workers. His was a genius that stimulated the science of medicine in nearly all of its varied branches, the results of whose work have made him one of humanity's greatest benefactors. Indeed when one reviews the immense amount of work that owes its origin to his own personal industry and genius, and the long list of publications which have been given to the world as a direct and indirect result of his stimulus, one is even justified in saying that the greatest medical master of the decade has gone.

It is perhaps invidious to make comparisons, nor should one endeavour to place in competitive columns the results of work that have emanated from such authorities as Jenner, Pasteur, Lister, Metchnikoff, and Ehrlich. Yet one feels, in making a mental note of the achievement of these masterminds, that Ehrlich has at least earned a position of equal respect with the very greatest. While it is true that many of his great achievements are as yet the subject of controversy, and that many of his results are no doubt a source of criticism in the scientific world, there is no one in this generation who has so altered the trend of medical thought as Ehrlich.

The line of research which he has initiated in immunity alone has done more to stimulate the study of the cause and prevention of disease than has the work of any other living man, or of most of those who have already passed on.

Throughout his varied achievements is to be observed one dominant idea, viz., the specific affinity between the chemical constitution of organs, cells, and cell-elements and their respective functions. This relationship in its chemical,

micro-chemical and physiological aspects, appears in every stage of his life-work as *the* feature that dominates all his researches from his earliest student days.

The inspiration of his cousin and friend, Berger, seems to have been the starting-point of his career. Berger was professor of neurology in Breslau when Ehrlich was still a student and when discussing the affinity of lead for nerve tissues as found in the paralyses of plumbism, Ehrlich developed his first ideas on these lines. It was this stimulus which led to his research on the granulation of blood cells, culminating in the foundation of modern hæmatology. It led further, to his important investigation of bacteriological stains, including the discovery of the acid-fast properties of the tubercle bacillus. Nay more, this same stimulus led to a study of the oxygen requirements of the organism, and later to his observations on intra-vital stains, (e.g. methylene blue), which has added so much to our knowledge of the pathology and clinical aspects of neurology.

This appreciation of protoplasmic affinities stimulated research in organic chemistry, and more especially in experimental work with aniline dyes, which at this time were being used with ever-increasing interest. His results along these lines made him more famous as a chemist among chemists, than as a physician among clinicians. In the course of this work he discovered the mast-cells, and classified the leucocytes along modern lines. Gradually these dominant ideas led to the creation of artificial affinities, and to the newer views of antibodies as incorporated in his side chain theory of immunity,—a field of study which in itself has produced almost a revolution in our understanding of disease. His famous epigrammatic teaching, *corpora non agunt nisi fixata* expressed in characteristic terseness his views with regard to protoplasmic affinities.

In this connexion, too, should be mentioned his standardization of the antitoxine of diphtheria, which made its practical clinical use possible. One step led to another, until finally came his great work on the synthesis of organic substances,

an experimental biological study which laid the foundation of modern chemo-therapy and to the discovery of salvarsan.

Thus throughout his career wherever he went, and at whatever he worked, he revealed new ideas, which when conceived allowed new avenues of research for his hosts of students and assistants to develop. Thus were laid the foundations, too, of hæmatology, chemo-therapy, and, in association with Behring, of sero-therapy as well.

So broad was his scope that in perusing his work, one may well wonder if his specialty was chemistry, physiology, histology, pathology or therapeutics and thus he demonstrated to the medical world that progress is only made by and through the experimental sciences.

His genius as an organizer was exemplified nowhere so forcibly as in his masterful handling of 606. In the early days of this discovery, it was of paramount importance that the drug should be tested by those worthy to be trusted. Consequently before appearing in public with any authoritative statement concerning the efficacy or utility of this drug, Ehrlich exercised tireless patience in the collecting of reliable data from those competent to experiment in its use. These data once assembled, he then submitted them to a rigorous reëxamination on the basis of his own profound researches in this field, and having eliminated discovered errors in these reports, he re-drafted the entire series of results giving the drug to the world not only with the authoritative explication of a master, but also the practical directions governing its use by practitioners.

Of his personal characteristics there is much worthy of note. He was gifted with rare combination of versatile genius and highly developed imagination. His exactness was on a par with that of the most thorough-going scientist, while his conscientiousness was ethical to a degree. Above all else in his capacity as an author he possessed the all too rare quality of refraining from rushing into print, deeply convinced of the truth that the prime function of a teacher is to be certain of the facts upon which his thesis is based.

As an index of his attention to detail it may be noted that even in the observations on his animal experiments, he manifested the self-same exemplariness which the physician displays in devotion to the human. It was said of him that in his rounds of the animal house, one instantly compared it to the ward visits of a hospital.

As one would surmise from the foregoing, modesty, simplicity, and entire absence of the dramatic were conspicuous traits of his character. Nor is it too much to say that these graces were no less exceptional than his intellectual attainments

EGYPTIAN OPHTHALMIA

THE presence of a British Expeditionary Force in Egypt at this time recalls to the student of ophthalmology the greatest epidemic of contagious conjunctivitis the world has ever known, as well as the important investigations made by early British oculists in connexion with this outbreak. Incidentally one sees how great have been the strides in medicine during the century that has elapsed, on contrasting the rational measures which now grant immunity to the troops with the complete ignorance on the subject which previously existed.

From the earliest times Egypt has been notorious for the prevalence of contagious eye diseases—a thing to be explained, not probably because of any untoward influence in the climate of the country, but because of the abject poverty, which, with its attendant evils, fell to the lot of the Egyptians under the oppression of their conquerors, and especially since 1517 under the misrule of the Turks.

On July 1st, 1798, Napoleon landed in Egypt with an army of about 35,000. Within a comparatively few weeks a very large percentage of these men were afflicted by a variety of infectious diseases, chief among which were conjunctival inflammations. Eventually two-thirds of the French troops were attacked, and it is not too much to say

that these disturbances constituted a deciding factor in the campaign. The British forces, commanded by Sir Ralph Abercromby, were infected almost to a man; and the troops of both France and Britain on their return to Europe lighted up an epidemic of the most frightful proportions during the remaining years of the Napoleonic wars. In 1818 there were more than 5,000 men blind from ophthalmia in the British army. In the Prussian army 20,000 to 25,000 soldiers were affected between 1813 and 1817; and in the Russian army 76,811 men contracted this dreadful malady in the period from 1816-1839. Because the epidemic had had its origin in Egypt, the term "Egyptian" ophthalmia was very often applied during these years to designate the scourge, though it has long been known that for centuries previously the disease had been almost universally endemic.

In 1810 a committee of medical experts was appointed by the British government to consider the best means of preventing and eradicating the malady. The report of these men is one of the classics of ophthalmic literature, stamped as it is by clearness of thought, close reasoning, and lucidity of expression altogether wonderful. They were the first truly to appreciate the infectious nature of conjunctivitis, though the final proof came much later with the work of Píringer; they realized what was also later demonstrated, that the Egyptian ophthalmia consisted of more than one type of inflammation; and we owe to them our first accurate description of the features which we now know to be characteristic of trachoma. The regulations laid down by the committee for the prevention and control of the malady, based as they were upon a clear conception of the disorder, would be judged adequate even at the present time. Owing to the difficulty of enforcing these regulations, however, trachoma persisted for many years at home and in British military stations abroad. Outbreaks occurred at the time of the Crimean War, during the Indian Mutiny, and again under Sir Garnet Wolsey in Egypt in 1882; but in the latter instance

only after the conditions following the battle of Tel-el-Kebir made it impossible to observe the precautions that had previously granted immunity. In the South African War trachoma was virtually unknown.

While the scourge of trachoma has been for the most part mastered in Europe, its eradication and treatment still remains one of the great problems of the Egyptian government. As giving an idea of its frequency, one learns that in 1913, out of 2,278 children at one of the state-aided kuttabs 93·2 per cent. were trachomatous, 65 pupils being blind in one eye, and 21 in both. At another station 92·4 per cent. of the 969 pupils were trachomatous, 34 being blind in one eye. The work of combating the disease had its origin in 1903 in a princely gift of £40,000 to the Egyptian government for this purpose by Sir Ernest Cassel. Under the directorship of A. F. MacCallan it is being ably and rapidly developed. To the travelling hospitals originally suggested have been added stationary hospitals and dispensaries in various parts of the country, and great assistance is now forthcoming from the native physicians and nurses who have been especially educated for this work. While the task that has been undertaken is enormous, one can look forward to the time when this scourge will be banished from the land, and Egypt will have, in the economic saving of thousands of heretofore disabled inhabitants, some measure of compensation for the sufferings of the past.

CHOLERA is reported to be prevalent in several districts in Germany; it is said to be most severe in Silesia, and to be present in Wiesbaden, Berlin, Breslau, and Frankfort. In Austria, together with smallpox, it has been in existence for more than a year. The disease is also reported from Riga and Petrograd in Russia. On August 1st, it was stated officially that there were 629 cases of Asiatic cholera in Austria. The prevalence of typhus fever in Austria and Germany is also reported.

THE employment of borsal powder and cresol paste in the treatment of wounds has been advocated by Sir Walter Cheyne. The method, however, has not found favour with medical officers who have tried it at the front. The prevailing opinion seems to be that, in deep wounds, the paste blocks the external exits and prevents the flow of secretions, and that, in slight wounds, the procedure is in no way superior to other methods of treatment.

A MEMORANDUM on the treatment of injuries in war based on experience in the present campaign has been issued by the War Office, though Messrs Harrison and Sons, of London. The volume consists of about 150 pages only. It summarizes the experience gained at the various military hospitals in France and its purpose is the attainment of uniform lines of treatment according to methods based on definite observation and experience at the front. As is indicated in the brief preface by Sir Arthur Sloggett, K.C.B., the Director-General of the Army Medical Service in France, the recommendations contained in the volume have been designed to meet the actual conditions encountered in the present campaign. The book is not on sale but is intended for the use of medical officers.

THE foundation stone of the physiological department of the buildings of the Welsh National School of Medicine at Cardiff was laid by Lord Pontypridd on August 12th, last. This building, with the great hall and staircase which are also to be constructed at once, form the first part of the National School. Later on, a department of public health and a school of preventive medicine, together with the necessary buildings for a complete school will be added. The funds for the buildings now under construction have been provided by Sir William James Thomas, who has promised a further sum of £60,000 for the additional buildings on condition that the Treasury made a grant adequate for the administration and maintenance of a medical school worthy of Wales.

Book Reviews

TEXT-BOOK OF FORENSIC MEDICINE AND TOXICOLOGY. By R. J. M. BUCHANAN, M.D., F.R.C.P., professor in forensic medicine and toxicology, University of Liverpool, eighth edition, revised and enlarged. E. S. Livingstone, Edinburgh, 1915. Price 7s 6d net.

A careful perusal of this edition, the eighth, shows it to be an excellent text-book. It treats in a clear and concise manner the subjects usually found in books on forensic medicine and gives a full, lucid and comprehensive statement of the action, symptoms and treatment of poisons. It is a book well adapted to the student and general practitioner.

PRACTICAL MATERIA MEDICA AND PRESCRIPTION WRITING with illustrations. By OSCAR W. BETHEA, M.D., Ph.G., F.C.S., assistant professor of materia medica, Tulane University of Louisiana. F. A. Davis Company, publishers, Philadelphia.

IN this octavo volume of about five hundred pages the writer has presented us with a brief statement of the more important therapeutic actions of all the official drugs of the United States Pharmacopeia, with a description of their various preparations and their doses. With each preparation is given several prescriptions for the most part copied from the recent writings of eminent physicians and specialists throughout the States, and minute details are given for their administration; thus enabling the practitioner to prescribe his chosen drug to the greatest advantage. In the last one hundred and fifty pages careful instructions are given on the writing of a prescription, on the choice of a vehicle, and on the avoidance of any incompatibility of the ingredients.

We have carefully examined this book and believe it will be of great value to the student and young practitioner. The illustrations are well selected. The typographical errors are not numerous. A few in which the dosage is at fault require caution, but as a whole we can recommend the volume, and have pleasure in placing a copy in our library for the use of students.

Books Received

The following books have been received and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

DISSECTION METHODS AND GUIDES. By DAVID GREGG METHENY, M.D., L.R.C.P., L.R.C.S. (Edin.), L.F.P.S. (Glas.), associate in anatomy and for some time senior demonstrator in the Daniel Baugh Institute, the Department of Anatomy and Biology, Jefferson Medical College, Philadelphia. Philadelphia and London: W. B. Saunders Company, 1914. Price \$1.25.

DISEASES OF THE ARTERIES INCLUDING ANGINA PECTORIS. By SIR CLIFFORD ALLBUTT, K.C.B., M.A., M.D., F.R.C.P., F.R.S., regius professor of physic in the University of Cambridge. In 2 volumes. Macmillan & Company, Limited, St. Martin's Street, London, 1915. Price 30s. net.

COLLECTED PAPERS FROM THE RESEARCH LABORATORY PARKE DAVIS & COMPANY, Detroit, Mich. Dr. E. M. Houghton, Director. Reprints Vol. 3, 1915.

A MANUAL OF SURGERY FOR STUDENTS AND PHYSICIANS. By FRANCIS T. STEWART, M.D., professor of clinical surgery, Jefferson Medical College. 4th edition. P. Blackiston's Son & Company, Philadelphia, 1915.

TEXT-BOOK OF CHEMISTRY AND CHEMICAL URANALYSIS FOR NURSES. By HAROLD L. AMOSS, S.B., S.M., M.D., DR.P.H. formerly chemist, hygienic laboratory, United States Public Health Service. Lea & Febiger, Philadelphia and New York, 1915.

CANCER, ITS STUDY AND PREVENTION. By HOWARD CANNING TAYLOR, M.D., gynæcologist to the Roosevelt Hospital, New York. Lea & Febiger, Philadelphia and New York, 1915.

Obituary

MAJOR JOSEPH LEWIS DUVAL, of Carleton, New Brunswick, died in London on August 26th, from acute gastritis. Major Duval was thirty-one years of age at the time of his death. He was born at St. John's, Quebec, and graduated from McGill University. He volunteered at the beginning of the war and joined the First Field Ambulance, C.E.F. with the rank of Captain, but was soon promoted to Major and placed in command of his corps. Major Duval was wounded at the battle of Ypres, when a shell burst close to an ambulance where he was attending to the wounded. The D. S. O. was bestowed upon him for his gallantry and especial mention was made of his daring attendance in the service of the Red Cross. He was invalided to England and placed in the Wim-pole Street Private Hospital, where he recovered sufficiently to leave the hospital; but he subsequently had a relapse, which proved fatal. His body was lost on the *Hesperian*. A widow and two children survive him.

Dr. W. R. Hall, of Chatham, Ontario, died August 21st. Dr. Hall was born in Richmond Hill, York County, in 1852. In 1874 he entered the Detroit Medical College and, four years later, received the degree of M.D. After practising for five years, he did some post-graduate work in New York. In 1884, he received the degree of M.C.P.S.O. from Trinity College, Toronto, and went into practice at Chatham. Dr. Hall was particularly interested in public health matters and was for many years medical officer of health at Chatham. He was a member of the Pan-American Health Officers' Association, the Canadian Health Officers' Association, and the Ontario Health Officers' Association, and served as president of the two latter bodies. He leaves a widow, a daughter, and a son, Dr. F. W. Hall, who succeeds his father as medical officer of Dover Township.

DR. LOUIS PHILIPPE TREMBLAY, of Montreal, died at the Hôtel-Dieu on September 7th, in the thirty-second year of his age. Dr. Tremblay graduated from Laval University. He leaves a wife and one child.

DR. ROBERT McDONALD, of Hagersville, Ontario, died August 14th. He was born in West Zorra, Oxford County, in 1850, and was educated at Woodstock. After teaching for a couple of years, he entered upon the study of medicine and graduated in 1868. He went into practice at Fullerton and, after a few years, moved from there to Hagersville. In addition to being coroner for the county, a position which he held for thirty years, Dr. McDonald was medical officer of health of Hagersville. In 1910, he was elected president of the Haldimand Medical Association. Two daughters and a son survive him.

DR. MARY FYFE, of Montreal, died August 30th. Dr. Fyfe graduated from Bishop's College, Lennoxville. She had been in practice for about twenty years.

DR. JAMES KIDD SIMPSON, died at Victoria, British Columbia, September 2nd, in the fifty-third year of his age. He was born in Ashton, Ontario, and practised at Juneau, Alaska, for some years.

News

MARITIME PROVINCES

THE Colchester-Hants Medical Association met at Windsor, Nova Scotia, on August 27th, under the presidency of Dr. Smith Walker, of Truro. The question of fees was discussed on this occasion and it was decided to increase the present charges.

It is announced that the St. John County sanatorium will be opened some time in November. Dr. H. A. Farris has been appointed medical superintendent.

ONTARIO

DR. THOMAS L. GRAY, of St. Thomas, has been appointed official surgeon for the southern division of the London and Lake Erie Railway and Transportation Company. Dr. Ferguson, of London, is the surgeon for the northern division.

THE following cases of infectious disease were reported in the province of Ontario during the month of August. Smallpox, 39 cases; scarlet fever, 53 cases, 2 deaths; diphtheria, 118 cases, 5 deaths; measles, 160 cases, 6 deaths; whooping cough, 101 cases, 5 deaths; typhoid, 52 cases, 6 deaths; tuberculosis, 85 cases, 59 deaths; cerebrospinal meningitis, 7 cases, 7 deaths. Total, 615 cases, 90 deaths. In August, 1914, there were 714 cases and 116 deaths.

CAPTAIN GEORGE MUSSON, M.D., who is in France with the First Canadian contingent, has been appointed medical health officer of Chatham.

THE cornerstone of the new hospital at Hamilton was laid on Friday, September 24th, by Sir John S. Hendrie.

OTTAWA is not yet free from diphtheria. In August twenty cases were reported, and from September 1st to 21st, twenty-two cases of the disease were reported. It is thought possible that the disease is transmitted by patients who have been released from hospital and, in order to avoid this, it is proposed to place patients who have been discharged from the Isolation Hospital in a separate building for two or three days under observation before they are finally discharged. The erection of a convalescent home for this purpose is under consideration.

QUEBEC

THE annual report of the Notre Dame Hospital, Montreal, has just been published. During the year under consideration 2,464 patients were treated, 1,317 men and 1,147 women. There were 837 ambulance calls. The work of the St. Paul Isolation Hospital has been greatly hampered by the lack of sufficient accommodation; it was necessary to refuse admission to 102 applicants during the past year. The patients who received treatment numbered over one thousand. A new hospital building is now under construction.

DR. J. A. LEDUC has been appointed head physician to the Foundling Hospital of the Grey Nunnery, Montreal, in succession to the late Dr. I. Cormier.

ALBERTA

DR. R. G. BRETT, of Banff, has been appointed Lieutenant-Governor of the province in succession to the Honourable G.H.V. Bulyea. Dr. Brett was born at Strathroy, Ontario, and is a graduate of the University of Toronto.

THE annual meeting of the Alberta Medical Association took place at Banff on August 20th and 21st, last. Next year the Association will meet at Edmonton, under the presidency of Dr. T. H. Whitelaw.

ARMY MEDICAL SERVICES

THE offer of the Canadian Government to provide a hospital for the treatment of French wounded has been accepted by President Poincaré, and it is announced that No. 4 Stationary Hospital, which is under the command of Colonel A. Mignault, of Montreal, will leave England very shortly and will take up its quarters near Paris. The hospital is equipped to accomodate five hundred.

A NUMBER of Canadians are now serving with the R.A.M.C. at the Dardanelles. Many of them are on hospital ships. Among others are Lieutenant W. P. MacKasey, of Halifax; and Dr. Colbeck, of Haileybury, Ontario.

DR. WILLIAM MANN, of Winnipeg, is temporary medical officer of the twenty-third reserve battalion, at present stationed at Dibgate, England. Colonel Blanchard, also of Winnipeg, is the president of the permanent board at Moore Barracks hospital; and Major Young is on the staff of the same institution.

MAJOR W. W. NASMYTH, of Youngstown, Alberta, has been promoted to the rank of colonel. He has so far recovered from his wounds that he hopes soon to return to the front; at present he is at Calgary engaged in recruiting and training men for service overseas.

DR. A. C. SCOTT, of Indian Head, Manitoba, has been appointed to the medical staff of the Canadian forces in England.

DR. INGS and Dr. Mewburn, of Calgary, have been gazetted majors in the Royal Army Medical Corps.

DR. J. W. RICHARDSON, formerly of Calgary, has been appointed surgeon-specialist in the Imperial army.

MAJOR CHARLES A. PETERS, A.M.C., of Montreal, has been gazetted lieutenant-colonel. Major Peters is in charge of the military work at the Montreal General Hospital; he saw active service in the South African war.

THE following doctors have joined the Royal Army Medical Corps. Drs. W. F. Kenney and M. A. MacAuley, of Halifax; Dr. Walker, of Truro; Dr. James Henderson, of Regina; Dr. J. H. Birch, of Calgary; Dr. Walt, of Stirling, Ontario; Dr. J. M. Casserly and Dr. J. D. Curtis, of St. Thomas, Ontario.

THE following have been appointed medical officers of overseas battalions: Lieutenant J. Maynard, of Stratford, Ontario, of the 92nd Battalion now encamped at Niagara-on-the-Lake; Captain D. W. Gray, of Calgary, of the 56th Battalion; Captain D. B. Neely, of Humbolt, Saskatchewan, of the 78th Battalion now in training at Sewell Camp, Manitoba. Captain Algar and Watt, of Stirling, Ontario, of the 80th Battalion; Captain J. H. Jones, of Brockville, Ontario, of the 8th Canadian Mounted Rifles, in succession to Captain Membury, resigned; Captain H. J. Stephens, of London, Ontario, of the 70th Battalion.

PROFESSOR IRVING H. CAMERON, of Toronto, has been gazetted lieutenant-colonel.

MAJOR C. E. DOHERTY, of New Westminster, assistant director of the medical supplies for the Canadian Overseas Forces, has returned from London. He will be attached to Militia Headquarters at Ottawa and will superintend the arrangements for the care of Canadian soldiers invalided from the front. There are already about three thousand wounded Canadians in England, most of whom will be in this country before the end of the year.

No. 6 Stationary Hospital, supplied by Laval University, is now up to full strength. The unit has been recruited in Montreal and will probably leave Canada about the beginning of November, previously spending a couple of weeks at Valcartier. The personnel is as follows: Commanding Officer, Lieutenant-Colonel G. E. Beauchamp, Majors J. O. D. LaCroix, J. P. Décarie and Georges

Bourgeois, Captain J. A. Lussier, Lieutenants J. U. Gariépy, J. de G. Joubert, J. E. Lorrain, L. D. Collin, Henri M. DuHamel, and Honorary Lieutenant E. R. LaMontagne, quartermaster.

Lieutenant-Colonel A. E. Ross has been appointed assistant director of medical services of the first Canadian Division.

THE following medical officers recently left England for France with their battalions: Captain A. A. Mackay, medical officer of the 42nd Infantry Battalion; Captain J. S. Jenkins, medical officer of the 24th Battalion; Major C. Laviolette, medical officer of the 22nd Battalion; and Captain J. R. Goodall, medical officer, and Lieutenant N. M. MacDonald, supernumary, of the Fifth Regiment, Canadian Mounted Rifles.

LIEUTENANT H. Hepburn, R.A.M.C., has been gazetted captain. The following lieutenants in the Canadian Army Medical Corps have been gazetted temporary lieutenants in the Royal Army Medical Corps: A. A. Skeels, W. J. Davidson, E. C. Chapman, D. S. Cassidy, B. Volume, T. A. Francis, H. Harvey, G. P. Armstrong, J. T. Bowman, C. Gaviller, J. F. Adamson, F. C. Stewart, J. F. Wood, W. E. Ainley, G. B. McTavish, J. R. Irwin, J. B. Haverson, D. Creighton, G. H. L. Armstrong, J. A. Wellwood, J. F. Sadlier, A. R. Munroe, F. L. McKinnon, D. L. Dick, to be temporary quartermaster, with honorary rank of lieutenant: F. H. Atkins, W. H. Owen, D. H. Macdonald and G. Drummond.

DR. STEWART, of Calgary, who is in charge of Queen's Canadian Hospital at Beachborough Park, Shorncliffe, England, has been given the military rank of major.

A REGISTER of the medical men in the province of Nova Scotia who are available for military service is in progress of preparation by the War Emergency Committee of the Medical Society of Nova Scotia. The members of the committee are Drs. John Stewart, H. E. Kendall, J. G. McDougall, J. R. Corston, and W. H. Hattie.

DR. M. A. MCAULEY, of Halifax, and Dr. Smith Walker of Truro, Nova Scotia, have been appointed to overseas corps and have left for the front.

LIEUTENANT E. L. SOUTTS, R.A.M.C., of Agincourt, Ontario, is attached to base hospital No. 15, Island of Lemnos.

THE Militia Department has accepted the offer made several months ago by Dalhousie University to supply a hospital for service overseas. Among the physicians who have volunteered to accompany the unit are Drs. John Stewart, J. G. MacDougall, G. M. Campbell, J. R. Corston, L. M. Murray, E. V. Hogan, and A. G. Nicholls. It is possible that the hospital will go to Alexandria, Egypt.

DR. J. K. MOSSMAN, of Toronto, recently returned from Serbia. Dr. Mossman contracted blood poisoning while in attendance upon patients suffering from typhus fever and for three months was unable to walk.

CORRESPONDENCE FROM THE SEAT OF WAR

NO. 3 CANADIAN GENERAL HOSPITAL, MCGILL

THE following notes are abstracted from letters recently received from members of the staff of No. 3 General Hospital, which is now located "somewhere in France," in the immediate vicinity of four other large general or base hospitals, each of one thousand beds.

The McGill Hospital has been in operation since August 10th, last, on which date it received its two first convoys of wounded soldiers. The work of organization of all details has naturally been extensive. A trainload (or convoy) of wounded comes down to the district from the clearing hospitals at the front nearly every night, or oftener as the case may be, and is distributed in ambulances to the various hospitals. Recently the McGill unit has been receiving repeated convoys of from 100 to 250 patients every second or third night. The rule is that all patients who would be fit for light duty in three weeks must be "evacuated" to England as soon as they can be moved, and batches of wounded are being sent off either in this way or to convalescent camps, or to "base details," every morning, so that in spite of the large admissions, the number in this hospital has not so far exceeded three hundred. The men arrive in many cases severely injured, but their *morale* is said to be splendid. According to their condition on arrival, they are known as "sitters" or "liers." The former arrive twenty-five to thirty in a huge conveyance, the latter on four stretchers to an ambulance. The convoys practically always arrive in the night, anywhere between midnight and four a.m.,

and the procedure of admission, which is much more elaborate than that in a civil hospital, demands the attendance and activity of the full registrars and admitting staff, who are up all night for this purpose. The "admissions" are made in a large reception tent, fitted with tables. There are four tables, each provided with two clerks and a questioner, where all particulars are accurately taken and recorded, four patients being dealt with at each table at once. They are then passed on to a fifth table where the registrar and two heads of the surgical and medical divisions sit, and where a provisional diagnosis is written out and the patient is assigned and carried off to his ward. In this way some sixty patients can be admitted in an hour, but the remainder of the night is occupied in entering admission cards in the official records, making out reports to headquarters, and "evacuating" suitable cases.

The hospital is well situated on sandy soil, which dries quickly after rain, and it is at present entirely under canvas, with the sole exception of the operating building, a wooden structure walled with a substance known as urolite. This has been erected under the personal supervision of Lieutenant-Colonel Elder, and has been splendidly organized by him. Owing to delay in the delivery of the Canadian ordnance, hospital tents have been supplied by the British Government, and consist of magnificent Durbar tents, part of a presentation made to the War Office by the Beghum of Scopal, and other Indian magnates, and sent out direct to the hospital from India by way of Marseilles. These tents are very large, some of them holding nearly fifty beds, with additional space in the centre for nurses work, and they lend themselves admirably to use as wards, and to being connected up in series. They are all floored and will soon be lighted with electricity. Each tent has an outer shell, and a narrow corridor two to three feet wide runs between this and the inner tent, thus securing shade and coolness in summer, and warmth in winter. The covering of the outer shell is grayish white with a double lining of soft red cotton. The inner tent is also of three layers, the innermost being a soft yellow cotton figured with flowers in a beautifully decorative and truly oriental style, and the tent poles and other wooden fixtures coloured correspondingly. There are said to be fifty-two of these larger tents and the appearance of the whole is palatial and really luxurious as well as picturesque. During the coming winter officers and men are expected to remain under canvas, but huts will probably be erected for the more serious sick cases and for the nurses.

The hospital has again its full contingent of nurses many of

whom were at first scattered, chiefly for instructional purposes, but have since been restored. A large number of its "fifth year students" (graduates of 1915) have accepted commissions in other military hospitals. With this exception the medical and surgical staff with which it sailed from Montreal is practically intact and all are said to be well, and are deeply engaged in loyally carrying out the noble purpose of alleviating the terrible sufferings of the war, and of returning the wounded soldiers who are capable of recovery to their duties at the front.

Of the other large hospitals in the immediate vicinity of this, one is No. 1 General Hospital under Drs. Finley, Maclaren, Brown, and Mackenzie Forbes, and another, lying directly beside the McGill Hospital, is the Harvard Unit. This is made up and officered entirely by representative men from Harvard University, with the sole exception of the Commanding Officer and Registrar, who are naturally British regulars of the Army Medical Corps, the American officers thus carrying on the medical and surgical work while discipline and returns are carried out entirely by the British officers. The Harvard staff are there for a period of three months, and are then replaced by others from the same school.

Correspondence

THE LATE PROFESSOR A. W. H. LINDSAY, OF HALIFAX

To the Editor,

CANADIAN MEDICAL ASSOCIATION JOURNAL:

SIR,—If you will kindly grant me space I should like to add something to the obituary notice, in your August number, of my friend the late Dr. A. W. H. Lindsay. I may confess that I was so much affected by the sudden tragedy of his death that I found myself unable to write, as I felt I ought to do, some account of him for the JOURNAL. It may not always be wise for an old and intimate friend to attempt this task. The aching heart and sense of loss make it difficult to write, with a proper sense of detachment, of those characters and qualities of our vanished friends which have an interest for those outside the circle of personal friendship. But as the days and weeks go by I realize more deeply the loss which our profession has sustained in the death of Dr. Lindsay, and the

remarkable tributes of affection and regard for his memory which have come to me from all parts of the Dominion and from former pupils in our hospitals at the front, impress me with the feeling that something more should be said in the JOURNAL of him and of his work. The great loss to the University of Dalhousie is, no doubt, of greater import to us here in the Maritime Provinces than in other parts of Canada, and yet his influence is not confined to this province. There are many old students of this school scattered over the whole Empire who remember to-day with gratitude and affection the zeal, patience and thoroughness with which Dr. Lindsay devoted himself to his duties as professor of anatomy. And I should like to say to them through the medium of the JOURNAL, that if they feel disposed to act on the suggestion made to me by more than one old Dalhousian that some memorial of their professor of anatomy should be instituted in the university, I shall be glad to hear from them. Perhaps a medal to be awarded as a prize in the class of anatomy would be a fitting memorial.

Dr. Lindsay's services to his university were not confined to the chair of anatomy. He was devoted to the interests of the medical school, through all its vicissitudes. Indeed, as assistant to the professor of chemistry, the late Professor George Lawson, he took part in the first year's work of the school, in 1868. He played a prominent part in disproving the ill-founded aspersions of the "Carnegie Report," and in the negotiations which restored the medical school to its original home in the university; at the time of his death he was secretary of the medical faculty, and I agree in the opinion of an old graduate, now holding a prominent position in the west, that our medical school "has lost her very best friend and ablest worker." No one since the founding of the school has devoted so much time, and thought, and energy to its work and welfare as Dr. Lindsay.

To many members of our profession Dr. Lindsay was best known as the registrar of the Provincial Medical Board and an authority on all matters of medical education and legislation. He was elected registrar in 1885 and was unanimously reelected in each succeeding year, for thirty years. He conducted the duties of this important office in a way which won the confidence and admiration of the Board, and proved him to be possessed of business abilities of a high order. The records of the Board in their precision, their exactitude, their scrupulous attention to the minutest details, are a testimony to the conscientious devotion with

which he did his work. For several years, indeed, he may be said to have acted as an adviser to the Board, for he had made a careful study of medical legislation in the different provinces of Canada and in Great Britain, and had an intimate knowledge of the educational requirements of medical schools throughout the English-speaking world. He had much to do with the late General Wimborne Laurie in securing the amendment to the Medical Act (Great Britain) by which Nova Scotia secured reciprocal registration in the United Kingdom. This special knowledge made him a valuable member of the Medical Council of Canada. To him and to Dr. J. S. Gray, registrar of Manitoba, the Council assigned the important task of revising the first draft of the rules and regulations of the Council and the consideration of its plan of examinations.

The loss of his nephew, Professor M. A. Lindsay, a young man of great promise, in the wreck of the *Empress of Ireland*, was a severe blow to Dr. Lindsay. In a very real sense, it broke his heart. Angina developed. It was only by a great effort and at the cost of much physical distress that he discharged the duties of his chair last winter. He himself was quite well aware of his critical condition. And, at the annual meeting of the Board on the evening of July 21st, the end came with startling suddenness, recalling the tragic circumstances of John Hunter's death.

Dr. Lindsay was a man of unusual mental ability. He took his B.A. degree at Dalhousie in his nineteenth year and in 1875 graduated in medicine. In the following year he went to Edinburgh and in one annus medicus he passed the three professional examinations required at that time and graduated M.B., C.M. in August, 1877. In addition to reading for these examinations he took out several classes, carried off two class medals, acted as assistant in the class of practical pathology and held an appointment in the wards of Professor Lister.

He was a man of a retiring disposition, averse from public appearances and only those who were his intimate friends had knowledge of his sterling character, his deep convictions, his affectionate nature and his admirable sense of humour. A conscientious devotion to duty was the keynote of his life. In the words of his old friend and colleague, Dr. D. A. Campbell, he was "the nearest approach to perfection of any man I knew."

JOHN STEWART.

Canadian Literature

ORIGINAL CONTRIBUTIONS

The Western Medical News, May, 1915:

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| War notes | T. A. Malloch. |
| A few remarks on antitoxin treatment | J. W. Turnbull. |

The Western Medical News, July, 1915:

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| The contrast between the surgery of the Civil War, and that of the present war | W. W. Keen. |
| Roentgen ray as an aid to diagnosis in abdominal conditions | D. S. Johnstone. |
| Hemorrhagica neonatorum | T. W. Sutherland. |

La Clinique, August, 1915:

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| Corps étrangers articulaires d'origine interne siégeant dans les articulations sinon saines du moins ne présentant pas de lésions grossières | A. P. Heineck. |
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The Public Health Journal, June, 1915:

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| Refuse destruction | R. O. Wynne-Roberts. |
| Supervision of communicable diseases in the smaller communities | H. W. Hill. |
| Symposium on cancer, Academy of Medicine, Toronto. Introductory remarks | C. J. O. Hastings. |
| What the physician can do towards the prevention of cancer | G. Chambers. |
| Observations on the prevention of cancer from the surgeon's standpoint | A. Primrose. |
| The attitude of the gynæcologist to cancer. | F. A. Cleland. |
| The attitude of the surgeon to the prevention of cancer | H. A. Bruce. |
| The Chinese laundry in Winnipeg | A. Officer. |

The Public Health Journal, July, 1915:

Administration of the Toronto Department of Public Health	H. L. Brittain.
The death rate of British Columbia	W. G. Home.
Tuberculosis problems from a public health standpoint	D. A. Craig.
Early diagnosis of tuberculosis	D. Townsend.
Sanitation of camps	A. Paull.

The Public Health Journal, August, 1915:

Administration of the Toronto Department of Public Health, II	H. L. Brittain.
Milk supply in relation to tuberculosis in Ontario	J. Race.
Some of the troubles of a rural medical officer of health and their remedy	M. Powers.
The playground attendance and the playground director	H. S. Curtis.
Military sanitation as applied to farms	V. F. Connor.
Sanitation of camps	A. Paull.

Medical Societies

WEST ELGIN MEDICAL SOCIETY

A MEETING of the West Elgin Medical Society was held at Port Stanley, Ontario, August 19th, under the presidency of Dr. Walker, of West Lorne. About thirty-eight doctors were in attendance. The principal feature of the meeting was a discussion on pneumonia, in which several of those present took part. The visiting physicians were afterwards entertained by the society.

HURON MEDICAL ASSOCIATION

A MEETING of the Huron Medical Association was held at Exeter, Ontario, September 8th, under the presidency of Dr. Kennedy, of Wingham. Papers were read by Dr. Hadley Williams, of London; Dr. A. T. Emmerson, of Goderich; and Dr. W. E. Gallow, of Goderich. It was proposed that county medical asso-

ciations should be affiliated with the Ontario Medical Association. The matter will be discussed further at the next meeting of the Association.

CANADIAN PUBLIC HEALTH ASSOCIATION

THE fourth annual conference of the Canadian Public Health Association, which was held in Toronto on Friday and Saturday, September 3rd and 4th, was in point of interest and value second to none. The conference consisted of five general sessions, all of which proved to be most instructive. The advantage of these general sessions afforded those attending an opportunity to hear all the papers read and discussed, a chance which was much appreciated.

The first paper presented on Friday morning was that on "Modern methods of sewage disposal," by George W. Fuller, consulting sanitary engineer, New York City. Dr. Fuller in this paper summed up the advantages and disadvantages of the various methods. Special reference was made to the activated sludge system. The discussion was opened by T. Aird Murray, of Regina, Saskatchewan, who described the experimental plant that they had installed on this principle in Regina. Later in the morning a paper was presented on the "Control of municipal and industrial wastes," by I. S. Osborne, by whom the subject was handled most ably, the advantages and disadvantages of the destructive method and also the reduction method of waste disposal being considered. Professor George Phelps, formerly of the Engineering Department, Harvard University, and now connected with the International Waterways Commission, presented an address on the work of this Commission, in which he briefly summarized the work that the Commission had accomplished in its efforts to control the pollution of the various international waterways.

On Friday afternoon the conference was held in the theatre of the Toronto General Hospital, when the diagnosis and care of the feeble-minded was considered. The clinic as presented by Drs. Clark, Withrow, and Hincks was of special interest, as many cases were shown demonstrating the different phases of the mentally defective from the idiot to the moron. Papers were presented on the education of the feeble-minded by Dr. Helen MacMurchy, and Dr. E. H. Young, of Kingston, and on the "Immigration of the feeble-minded," by J. D. Pagé, of Quebec.

On Friday evening the President's address by Dr. M. M. Seymour, Commissioner of Health, Saskatchewan, was given. Dr. Seymour's illuminating address embraced the various phases of Public Health Work, and the various lines of progress in the field of preventive medicine. He also pointed out weaknesses and fields of action that had been more or less neglected, and endeavoured in this way to strengthen the weak points. Following this was a very instructive illustrated address on "Practical methods of obtaining pure milk," by Dr. Charles E. North, consulting sanitary expert of New York City. This was listened to with intense interest. Dr. North presented in this address the fact that sanitary milk with a low bacterial count can be procured by absolute cleanliness on the part of the producer, without any frills. He particularly emphasized the point that the great factor in the production of clean milk was the man himself, but that no milk was safe without pasteurization.

Saturday morning was devoted to the housing problem. A visit was made to the housing scheme of the Toronto Housing Company, where the members of the conference had an opportunity of seeing for themselves the possibility of combining æsthetic taste with usefulness and utility in homes at a moderate rental. A paper was presented on "Housing conditions in Canadian cities," by Dr. P. H. Bryce, Chief Medical Officer for Immigration, Department of Interior, Ottawa, and also papers on "A housing experiment at Toronto," by Mr. G. Frank Beer, chairman of the Toronto Housing Company, and the "Effects of town planning in improving housing conditions," by Mr. Thomas Adams, Town Planning Advisor, Commission of Conservation, Ottawa. These papers were listened to with very great interest and covered most phases of the problem. A free discussion followed in which Dr. Evans, of Chicago, took an active part.

The Saturday afternoon session was devoted largely to Medical Social Service. The first paper presented was on the "Control of venereal diseases in municipalities and military camps," by Dr. W. A. Evans, of Chicago, and the discussion was opened by Lieutenant-Colonel F. W. Marlow. The second paper was "Notification of venereal diseases," by Dr. J. A. Hutchinson, Westmount, Montreal. This was followed by a paper on "Health and charity," by Professor S. M. Gunn, Secretary American Public Health Association, which was followed by a paper on "Notification of tuberculosis," by Miss Dyke, of the Department of Public Health, Toronto. A very interesting discussion followed this

symposium, in which different members outside of the city, as well as in the city, took active part.

In the evening many members of the conference were entertained at the Canadian National Exhibition.

The officers elected for the ensuing year were: Dr. Peter Bryce, Chief Medical Officer for Immigration, Department of Interior, honorary president; Dr. Charles J. Hastings, Medical Officer of Health, Toronto, president; Dr. J. D. Pagé, Quebec, vice-president; Dr. Porter, Toronto, treasurer; Dr. Oswald Withrow, Lumsden Building, Toronto, secretary.

MONTREAL MEDICO-CHIRURGICAL SOCIETY

THE seventeenth regular meeting of the society was held Friday, June 4th, 1915, Dr. F. A. L. Lockhart, vice-president, in the chair.

PATHOLOGICAL SPECIMENS: Series by Dr. Horst Oertel.

1. The first specimen is a typical scirrhus cancer of the breast removed by Dr. Garrow, which I exhibit because, by this special method of staining "en masse" by scarlet red, it shows exceedingly well the seat and the progress of the cancer. If one stains fat with Sudan or scarlet red, the fat takes, as you know, the red stain tenaciously while other tissues reject it or are easily decolourized. You can see that all the fat tissue of the breast, which makes up the bulk of the organ, assumes the scarlet red stain, while all the carcinomatous tissue has practically remained unchanged white. It needs very little other explanation; the main bulk of the tumour rests well within the red fat tissue of the breast and progressing from the main tumour mass you see the strands of white fibrous carcinomatous tissue invading the surrounding fat tissue of the breast and growing beyond it. If one looks at it carefully one sees that, in the main, the cancer extends between lobes or lobules of fat tissue, apparently following interstitial lymphatics. In this way an almost crab-like appearance of the tumour is produced, so that the name cancer seems extremely well applied.

2. Gun-shot wound of the brain. The patient was an old man who in despondency committed suicide by putting a revolver in his mouth and discharging a twenty-two calibre bullet through his palate. It went up through the roof of the mouth, entered the base of the brain, in the frontal region to the left of the olfactory bulb, running immediately outside of the lateral ventricle, then

crossed the white matter to the cortex, producing a pial hæmorrhage and finally lodged within one of the frontal convolutions, where it rested and was found at autopsy.

3. Tuberculous meningitis with tubercles in left posterior cerebral artery. Usually the tubercles are abundant in the pia arachnoid at the base of the brain, where they are associated with characteristic gelatinous exudate. In this particular case there is found in addition a somewhat rarer finding: several very definite tubercles in the wall of the posterior cerebral artery. The specimen shows very plainly two small tubercles situated in the wall of the artery itself. This Circle of Willis is also interesting from the anatomical stand-point, because it shows an anomaly of the anterior communicating artery; there are two anterior communicating arteries with anastomosis between them.

CASE REPORTS: A series of unusual surgical conditions, by Drs. A. T. Bazin and J. Scott.

In the absence of Drs. Bazin and Scott, Dr. L. P. McHaffie read the case reports, as follows:*

1. Case of volvulus of the small intestine in a new born infant.
2. Hour-glass contraction of the stomach, due to traction from an umbilical hernia.
3. Double inguinal hernia in a marantic infant.

DISCUSSION: Dr. W. M. Fisk. In connexion with this last case I might say that the child was a premature infant, born at the seventh month (labour induced on account of the mother's condition) and weighed three and a half pounds. From the first there was noticed on the right side some prominence in the right inguinal ring. The baby cried a great deal from birth. He was brought up on the bottle and had a great deal of vomiting and apparent distress. At three and a half months there developed an inguinal hernia. I put on a soft rubber double truss but was unable to keep the hernia in place. The child cried constantly, was very small and thin and at five and a half months weighed six pounds. On August 22nd, at five and a half months of age, Dr. Bazin operated to try to relieve the condition. The left hernia was the sigmoid, reducible, the right showed an elongated mass which was tender to pressure and proved to be the cæcum and appendix, the latter being firmly adherent to the sac and irreducible. Recovery from the operation was uneventful and the child lived to be one year old, was greatly improved and weighed eleven pounds. At this time, however, he contracted broncho-pneumonia from which he died.

* Published in the August number of this JOURNAL.

PAPERS: (1) Pressure paralysis, (traumatic) by Dr. D. A. Shirres.

The following is a synopsis of the address by Dr. Shirres on this interesting class of paralyses, as illustrated by cases occurring in his hospital practice during a period of two or three months.

1. *Peripheral Nerve Paralysis*—(a) musculo spiral (Saturday night paralysis), (b) circumflex (shoulder dislocation), (c) circumflex and musculo spiral (shoulder dislocation), (d) double musculo spiral (crutch paralysis), (e) wrist-drop (chloroform anesthesia), (f) wrist-drop (tourniquet round forearm), (g) ulnar paralysis (wound in wrist), (h) sciatic (obstetric paralysis), (i) foot-drop (plaster bandage), (j) birth palsy.

2. *Spinal Cord Paralysis*—(a) monoplegia, (Tbc. tumor of cord), (b) paraplegia (endothelioma), (c) paraplegia (Pott's Disease), (d) paraplegia traumatic (fracture dislocation).

3. *Cerebral*—(a) hemiplegic, blood clot, traumatic, (b) hemiplegic, blood clot, arterio sclerosis, (c) wrist-drop, hæmorrhage, prterio sclerosis.

Peripheral. Etiology: Pressure or trauma to peripheral nerve, leads to more or less disorder of movement, sensation, reflex excitability, vasomotor and trophic functions. The effects of pressure differ only in degree; results may be transitory or permanent disturbances. Explanation of what takes place pathologically. Myelin sheath, axis cylinder. Regeneration, following pressure upon or division of a nerve. Electrical excitability of (a) nerve, (b) muscle. Symptomatology: Mixed nerve, (a) motor functions constantly affected,—paresis or paralysis, flaccidity, diminution or absence of tendon reflexes, atrophy, electrical changes and loss of electrical sense. (b) Sensory, paresthesias. Injury of a mixed nerve gives rise almost constantly to paresthesias and often to pain. These occur especially when the nerve is incompletely divided or the pressure is not severe enough to obliterate function, (numbness, pins and needles, clumsiness). Anesthesia, by no means constant and if present limited in area; anastomosis, sensory fibres are more capable of resistance and regeneration. Integrity of a few fibres suffice. Objectively, sense of cold and pressure suffer first, warmth and pain subsequently. (c) Vasomotor, skin red, smooth, glossy and tender, local rise of temperature, trophic disorders of bones and joints. (d) Secretory, hyperidrosis or anidrosis.

Course, depends upon severity. Treatment, transplantation.

Prognosis, determined by condition of electrical excitability.

Spinal, (a) Alfred Allen's experiments on trauma of the cord.

- (b) Effect of tuberculin in a case of tuberculosis of the human cord.
- (c) Description of diagnosis and *operation on a case of tumour of the spinal cord successfully removed, May, 1914.*

Pressure may produce partial or complete paralysis—(a) partial pressure: (1) motor paresis, muscles spastic, hypertrophied, reflexes increased, no electrical change; (2) sensory, may not be disturbed: (b) complete pressure, (1) motor paralysis, flaccid muscles, reflexes lost, no electrical changes; (2) sensation abolished.

Treatment. Remove the cause. *Report on first known successful case of transplantation in spinal cord* (own case).

Cerebral. Hemiplegic or diplegic, motor and sensory symptoms same as spinal.

Treatment. Operation.

DISCUSSION: Dr. G. S. Mundie. This paper has interested me very much because it is along my own line of work. I have had several cases of this pressure paralysis. In one, a young lady who had a fracture of her forearm, who had had a tourniquet applied above the elbow, it is now three months since the operation and she is only beginning to show a restoration of muscle function. Another case had paralysis of the ulnar nerve after dislocation of the elbow. Dr. Shirres has brought the conditions before us clearly, showing the anatomy and pathology of such conditions. Ballance and Purves Stewart have written and appeared to prove that regeneration does take place in a severed nerve. However, the Continental workers, especially in Italy, have not accepted this view and it is still a debatable point whether regeneration does take place from the axis cylinders growing down into the distal end or from the cells of the neurilemma sheath. The consensus of opinion is, I think, more in favour of the axis cylinder theory that they grow down from the nerve into the distal end. Of course, it is a hard thing to prove definitely and it is very hard when you have a patient come to you who wants to know definitely how long the nerve is going to take to get well and you can tell only proximately. One case of a man stabbed in the wrist, when the median nerve was severed, was sutured up and in six months he got back his power of sensation, but it was twelve months before he began to have any motor power at all. It is generally said that a nerve grows about 1 mm. a day.

Another thing I was glad Dr. Shirres pointed out was about the electrical sense; I have noted this in practically all my cases. His report of the transplantation of the spinal cord is certainly very interesting and his advice to operate at once on all traumatic cases

of the vertebral column is certainly one I think should be followed that no time may be lost. It is not a serious operation and in competent hands can be done very easily.

Dr. N. Viner: I would like to call attention to a class of cases which might be called "sub-neuritic," cases in which the pressure on the nerves is not great enough to cause severe pain or serious weakness, or to present the "reaction of degeneration," trophic changes in the skin, or to cause a diminution of the "electrical sense." Such conditions may be present anywhere but we see them in the greatest frequency in pregnancy and in pathological conditions, such as tumours, inflammations, in the pelves of men or women. In such cases it is generally difficult to make a definite diagnosis of neuritis, but in view of the more or less continual stabbing pains, pins and needles sensation in tips of toes or fingers, the pains in the thighs or legs of pregnant women, we are justified in coming to that conclusion.

On the other hand there is a series of conditions, which are not neuritis, yet which on account of similarity of symptoms require differentiation. Symptoms such as the above, for example, may be found in various degrees of Raynaud's disease. Again women, particularly when approaching the menopause, who do much scrubbing, or have their hands a great deal in hot and cold water, often suffer in a similar manner. In this latter condition, which is termed "acroparæsthesia," pins and needles sensations and pains in the hands are very common.

Since our views in regard to regeneration of cut nerves are still in the domain of theory, perhaps I may venture a theory too. Dr. Mundie has just remarked that sensation may return at six months, while motion may not return for a year. The disparity in time of the return of the two functions is a common observation of every neurologist. Why then shall we not assume that regeneration of sensory and motor fibres takes place in opposite directions to correspond with their structure, arrangement, and function—that is, sensory fibres regenerate from periphery to centre, from skin to spinal cord, motor fibres from centre to periphery, from spinal cord to muscle, etc. The sensory and motor neurones are laid alongside each other but in opposite directions; they function and possibly grow in opposite directions—why may they not regenerate in opposite directions?

Dr. A. H. Gordon: Dr. Shirres' remarks on the absence of reflexes when the cord is completely severed are most interesting. This thing has on many occasions troubled me and I would like to ask if there is yet any explanation of the fact that in the human

being it is the case that on complete division of the spinal cord the reflexes below the division are absent, whereas in animals—dogs for instance, severance does not give rise to such conditions. It seems to me there has never been any completely satisfactory explanation of the difference in the reaction to spinal injury in the human and in the relatively lower animals.

Dr. D. A. Shirres: With regard to Dr. Gordon's remarks it is unanimous to-day that transverse division of the cord is a flaccid paralysis; in animals, dogs and monkeys, transverse division is a spastic or increased reflex condition, the very opposite. In one case of a newly born child who through some accident had a division of the spinal cord it was spastic but in a fortnight was flaccid showing that the new born child is very near the animal. Faradic excitability is not present in a child till six or seven months of age. The reason for the flaccid paralysis in man is that nerve action must be continuous; in the dog it is not necessary, you can divide it and still they live and exist, and in the still lower animals—the worm—you know how that can be divided again and again. There are quite a number of those patients who complain of pain, sensation of pins and needles and numbness with no motor enfeeblement, no sensory anæsthesias and no electrical disturbance and it is hard to come to a diagnosis as to whether it is neuritis or not. But I have no hesitation in saying that it involves an irritation of the nerves. Head is quoted as saying that the Almighty provided a wonderful circulation as to anastomosis and he feels that He also provided the sensory nerves with anastomosis and also a motor anastomosis. There must be some explanation for these cases of regeneration. Stewart gives beautiful photographs of regeneration in the peripheral end and my own feeling is that this is right.

2. Patent foramen ovale, illustrated by two cases: Specimens and lantern slides, by Dr. Maude E. Abbott.

DISCUSSION: Dr. J. A. Henderson. I should like to congratulate Dr. Abbott on the splendid, clear and interesting way in which she has brought this subject before us to-night; it was this particular paper which brought me to the meeting. There is very little can be added in the way of discussion and we have learned a great deal. On looking over the material in the dissecting room at the college I found that we had not come across a single case of patent foramen ovale during the session just passed; in the previous session we found two cases. In one of them there were two comparatively small openings, each rather larger than the size of a match; the other one was quite a considerable size, almost half an inch in diameter and apparently had been pretty well patent all

through life though the subject was an old man. The valvular form of patent foramen is rather frequently found in the dissecting room but there is patency only when a probe is passed through and under all ordinary circumstances no intercommunication of blood takes place. I think the point Dr. Abbott brought out in the first specimen very well taken. I do believe we have been inclined to lay too little stress upon the effect of pressure. At the time of closure there is merely a very slight difference in pressure between the right and left sides of the heart and it is quite apparent that if this pressure balance were disturbed it would be easy to have a patent foramen ovale as Dr. Abbott so clearly showed in the first specimen.

Dr. N. Viner: I would like to ask in connexion with the clinical histories quoted by Dr. Abbott whether this condition has anything to do with the early menopause mentioned.

Dr. W. S. Morrow: I feel that none of us here are in a position to discuss congenital anomalies of the heart with Dr. Abbott. She is recognized, not only in Montreal, but in the medical world generally as an authority on this subject and we need not be ashamed to confess our relative ignorance. The most important practical lesson that I have drawn from her paper is the fallacy of the current idea that one has to look for signs of congenital abnormality of the heart only in cases of blue baby and other forms of cyanosis. I will try in future to consider the possibility of congenital anomaly being present in obscure cases of heart disease even in the complete absence of cyanosis. One curious little point in connexion with the second case was that Dr. Abbott spoke of a presystolic thrill and murmur in association with auricular fibrillation. Presystolic has come to be associated in our minds with auricular systole. As we have no effective systole of the auricle in cases of fibrillation we do not usually speak of the thrill and murmur as presystolic but rather as early, mid, or late, diastolic, as the case may be.

Dr. D. H. Bernstein: Dr. Abbott's paper is of particular interest to me at present. During the last few months we had two cases of congenital heart disease in children at the Herzl Dispensary, while in my own practice I came across one case five years ago. Of these three cases one was a case of pulmonary stenosis and the other two I think were cases of patent foramen ovale. Of the two cases of patent foramen ovale one patient is now over five years old. The murmur, in this case, has completely disappeared and the child is practically normal. The other case has only been under observation at the dispensary for about six weeks.

The patient who is now five years old is the more interesting. I confined the mother, a primipara, on April 11th, 1910.

Labour was normal. The baby weighed four pounds at birth. On account of the small size of the child I examined him very carefully on the eighth day and I found a systolic murmur at the base of the heart, most marked at the pulmonary region. The complexion was dark but I did not think that it was cyanosed. The baby was breast fed and did well for about six months. At six months he had an attack of convulsions lasting about two weeks with daily recurrences. Signs of rickets made their appearance about this time with extreme craniotabes. There was hardly any ossification of the bones of the skull. The child was breast fed eighteen months, with cow's milk from the milk station added after the twelfth month. He began to walk at two years of age and cut the first tooth at the age of two. He was a constant sufferer from bronchitis. The cardiac murmur persisted until about two years of age. I saw the child yesterday and I found hardly any sign of rickets while the murmur has completely disappeared. This boy was also treated for some time in the out-door department of the Royal Victoria Hospital.

The other case of patent foramen ovale was brought to the dispensary on March 31st, 1915. H. L., female; aged six months; mother complained that the child had suffered from bronchitis from birth. On examination a systolic murmur was heard over the pulmonary area, no cyanosis. Child born at full term, breast fed, is markedly rachitic and aside from bronchitis had no other illness. The case is still under observation.

Dr. M. E. Abbott: I would like to thank Dr. Henderson for his kind remarks and appreciation of my paper. As to Dr. Viner's question the early menopause occurred only in the second case in which there was true arrest of development. It is well known that in cases of arrest of development of any kind menstruation is apt to set in late and leave early, just as we noted in our case. In the other patient menstruation began at thirteen and was normal till the last nine months of life; the patient died of advanced nephritis and throughout was an extremely chlorotic subject, which explains the termination of the menses in the last nine months of life.

With regard to Dr. Morrow's remarks as to the absence of cyanosis, that is one of the fallacies of medicine, namely, that patent foramen ovale means blue baby. We have a number of specimens of interauricular septal defect in the museum and in not one of them was cyanosis mentioned in the clinical history, except perhaps at the termination of the case. As regards the value of positive venous pulse as a diagnostic sign in these cases, of course that does not apply to cases of mitral stenosis with auricular fibrillation but to cases of mitral insufficiency with no fibrillation.

Medical Societies

- CANADIAN MEDICAL ASSOCIATION:—President—Dr. Murray MacLaren, St. John, N.B. President-elect—Dr. R. E. McKechnie, Vancouver. Secretary-treasurer—Dr. W. W. Francis, 836 University Street, Montreal.
Annual Meeting, Vancouver, B.C., 1915, postponed.
- ACADEMY OF MEDICINE, TORONTO:—President—Dr. W. H. B. Aikins, 134 Bloor Street West. Secretary—Dr. J. H. Elliot, 11 Spadina Road.
- ALBERTA MEDICAL ASSOCIATION:—President—Dr. T. H. Whitelaw, Edmonton. Secretary—Dr. F. C. Clarke, Calgary.
- ASSOCIATION OF MEDICAL OFFICERS OF THE MILITIA:—President—Lt.-Colonel A. T. Shillington, A.M.C., Ottawa. Secretary—Captain T. H. Leggett, A.M.C., Ottawa.
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- COLCHESTER-HANTS MEDICAL SOCIETY:—President—Dr. J. W. T. Patton, Truro. Secretary—Dr. H. V. Kent, Truro.
- EDMONTON ACADEMY OF MEDICINE:—President—Dr. C. U. Holmes. Secretary-treasurer—Dr. E. L. Garner. Library, 12 Credit Foncier, Building.
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- MEDICINE HAT MEDICAL SOCIETY:**—President—Dr. W. M. Thomas. Vice-President—Dr. W. H. MacDonald. Secretary-treasurer—Dr. A. V. Brown.
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- NEW BRUNSWICK MEDICAL SOCIETY:**—President—Dr. W. W. White, St. John. Secretary—Dr. J. D. Lawson, St. Stephen. Treasurer—Dr. W. E. Gray, Milltown.
- NIAGARA DISTRICT MEDICAL ASSOCIATION:**—President—Dr. E. T. Kellam, Niagara Falls. Secretary—Dr. G. M. Davis, Welland.
- NOVA SCOTIA MEDICAL SOCIETY:**—President—Dr. C. J. Miller, New Glasgow. Secretary—Dr. J. R. Corston, Halifax.
- ONTARIO MEDICAL ASSOCIATION:**—President—Dr. H. B. Anderson, 184 Bloor Street East, Toronto. Secretary—Dr. F. A. Clarkson, 421 Bloor Street West, Toronto. Assistant Secretary—Dr. F. C. Harrison, 29 Roxborough Street West, Toronto.
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- PRINCE EDWARD ISLAND MEDICAL ASSOCIATION:**—President—Dr. A. A. MacDonald. Secretary—Dr. W. J. MacMillan, Charlottetown.
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